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the OIL AND GAS JOURNAL

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A new tool never just "happens." Months, even years, may pass before it emerges from a mountainous bundle of blueprints. That's "API" for Halliburton ... where research holds the place of highest concern ... where the greatest skills of engineering are dedicated to designing the tools of tomorrow.

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IN PRODUCTION
IMPROVEMENT TECHNIQUES

HALLIBURTON OIL WELL CEMENTING COMPANY
DUNCAN, OKLAHOMA

THE OIL AND GAS
JOURNAL
Vol. 51, No. 39

NEXT WEEK

- World's Largest Drilling Barge Is Answer to Inland-Water Drilling.
- The Differential - Lateral Curve.
- Petrochem Report: Oronite Chemical Co.
- Fairview Presents Healthy Economic Picture.
- Michigan Refiner Cuts Operating Losses.
- Vacuum Unit Produces Exceptionally Clean Gas Oil.
- Nolan County, Texas, Presents Promising Prospects.
- Other Articles and regular features.

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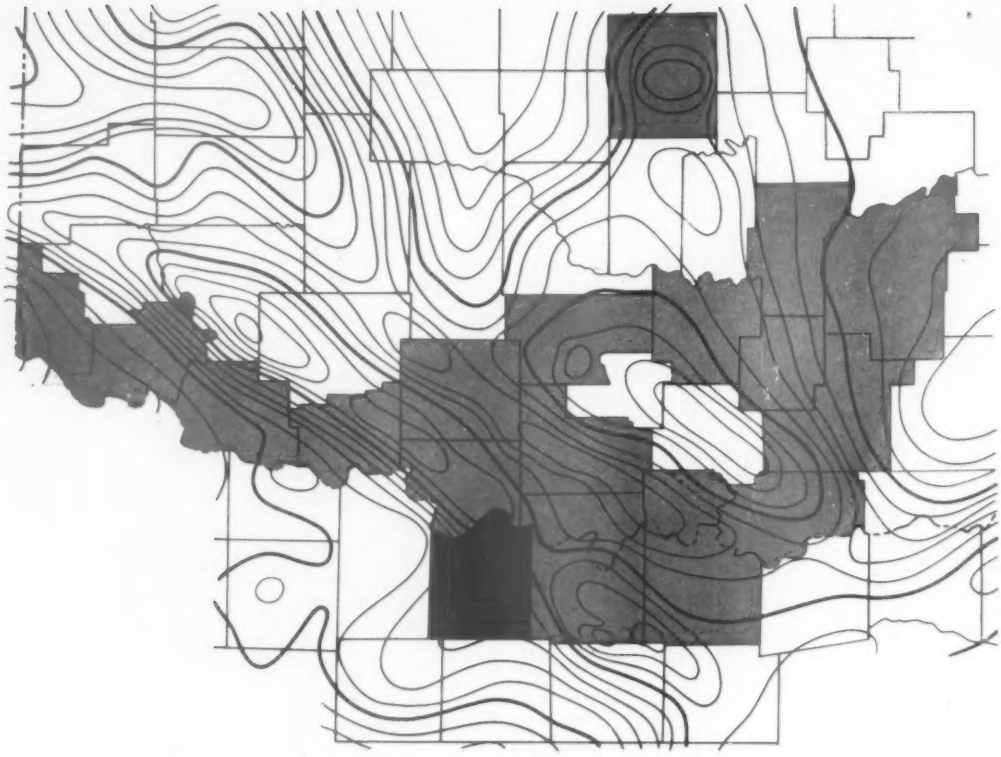


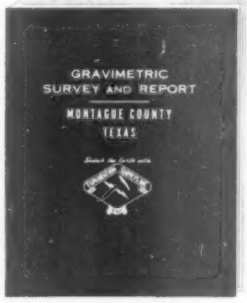
Red River Region Report: ***Montague County, Texas***

Current exploratory and drilling activity indicates that Montague County is developing into one of the most important areas in the promising Red River region. Our Gravimetric Survey and Report on Montague County is a complete volume of geological and elevation data, supported by isogal, derivative, elevation, and ownership maps, with comprehensive interpretations of each exhibit. The Report covers the entire county, and is comparable in every detail to a regular contract survey. This reliable, authoritative volume is available at $3,090.00 — only a fraction of the cost of conventional reconnaissance.

If you have interests in Montague or in other counties in the Red River region of Texas and Oklahoma, we urge you to investigate this and other E.S.I. Reports on that area. Write on your firm's letterhead or wire us at 6515 Daniels Avenue, Dallas, Texas, or telephone EMerson-6663. There is no obligation, of course.

(Other E.S.I. Report volumes for the Red River region are available as indicated on the map (dark grey), and for Scurry, Jones, and Haskell counties in West Texas.)

EXPLORATION SURVEYS INC.
COUNTY GRAVIMETRIC REPORTS



How to INCREASE BOILER RATINGS

with your present furnace and stack

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Coppus-Dennis **FANMIX** Burners give you *perfect* mechanical mixing of fuel and air *at the burner outlet . . . instantaneous* ignition close to the burner . . . and *complete* combustion *without visible flame* when burning natural gas. No other burner combines these three advantages.

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Because **FANMIX** can be guaranteed to secure complete combustion of natural gas *with less than 5% excess air*, you get uniform "radiant heat" *without drifting hot spots*. That's why a **FANMIX**-fired furnace seldom varies in temperature more than 5% over its entire area.

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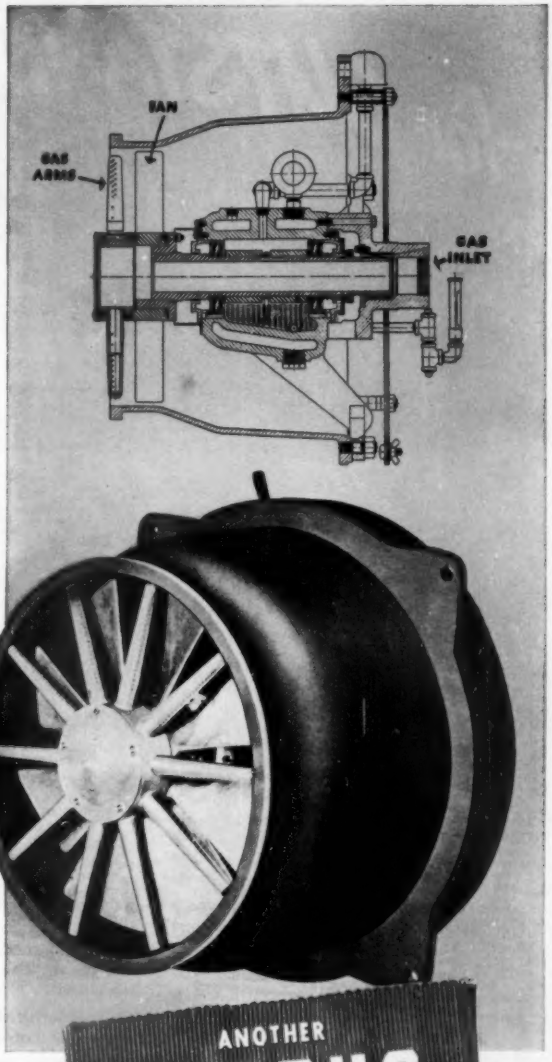
Send for the Coppus-Dennis **FANMIX** Bulletin 410–6. Coppus Engineering Corporation, Worcester 2, Mass. Sales Offices in THOMAS' REGISTER. Other Coppus "Blue Ribbon" products in BEST'S SAFETY DIRECTORY, CHEMICAL ENGINEERING CATALOG, and REFINERY CATALOG.



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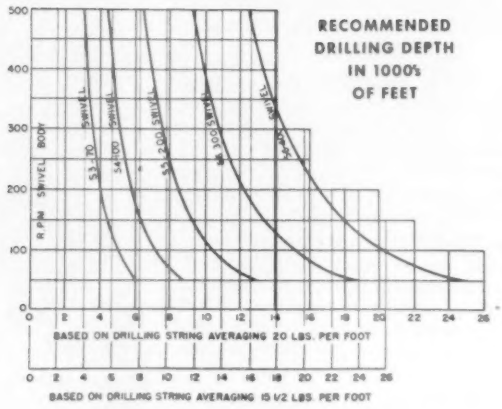
RECOMMENDED DRILLING DEPTH IN 1000's OF FEET
R P M SWIVEL BODY
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S4-100 SWIVEL
S5-200 SWIVEL
S6-300 SWIVEL
S6-400 SWIVEL
BASED ON DRILLING STRING AVERAGING 20 LBS. PER FOOT
BASED ON DRILLING STRING AVERAGING 15 1/2 LBS. PER FOOT

THIS RATING CHART gives you a quick picture of the drilling depths at various RPM's for which each of "Oilwell's" five swivel sizes is conservatively recommended.

SWIVEL TYPE	DEADLOAD CAPACITY IN TONS
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S4-100	100
S5-200	200
S6-300	300
S6-400	400

. . . note these important features

- Widely-spaced top and bottom radial bearings stabilize the load. The top or auxiliary bearing also absorbs up-thrust.
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- All bearings run in a cooling bath of oil.
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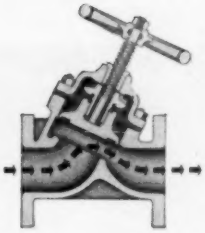

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WORKING PRESSURES—up to 150 pounds. Water, air, oil, or gas, 180°F. maximum temperature, depending on valve size and materials.

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Full specification data is in your new Crane 53 Catalog—or ask your Crane Representative.

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THERE'S A JOHNS-MANVILLE PACKING AND GASKET FOR EVERY SERVICE

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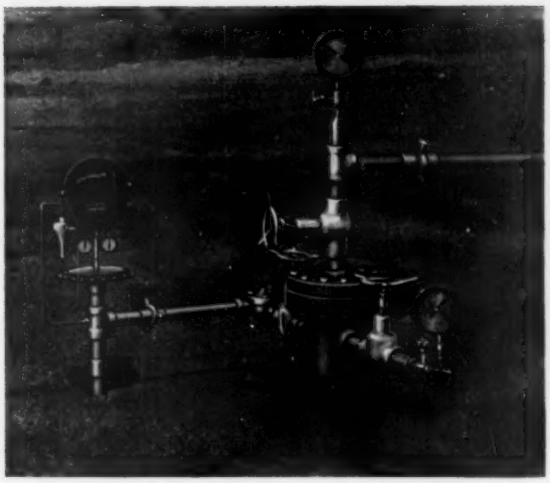

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and keeps lift costs at an absolute minimum

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GUIBERSON GAS LIFT MANUAL!

Guiberson Gas Lift Equipment is protected by the following patents:
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Cities Service safeguards its fine lubricating oils with a blanket of DRY air...

From this compartment aboard the Cities Service tanker, SS Winter Hill, a Lectrodryer feeds DRY air to tanks in which lubricating oil is transported.

Lectrodryers like this one at the Petty's Island Refinery are installed around tank farm to safeguard lubricating oil in storage.

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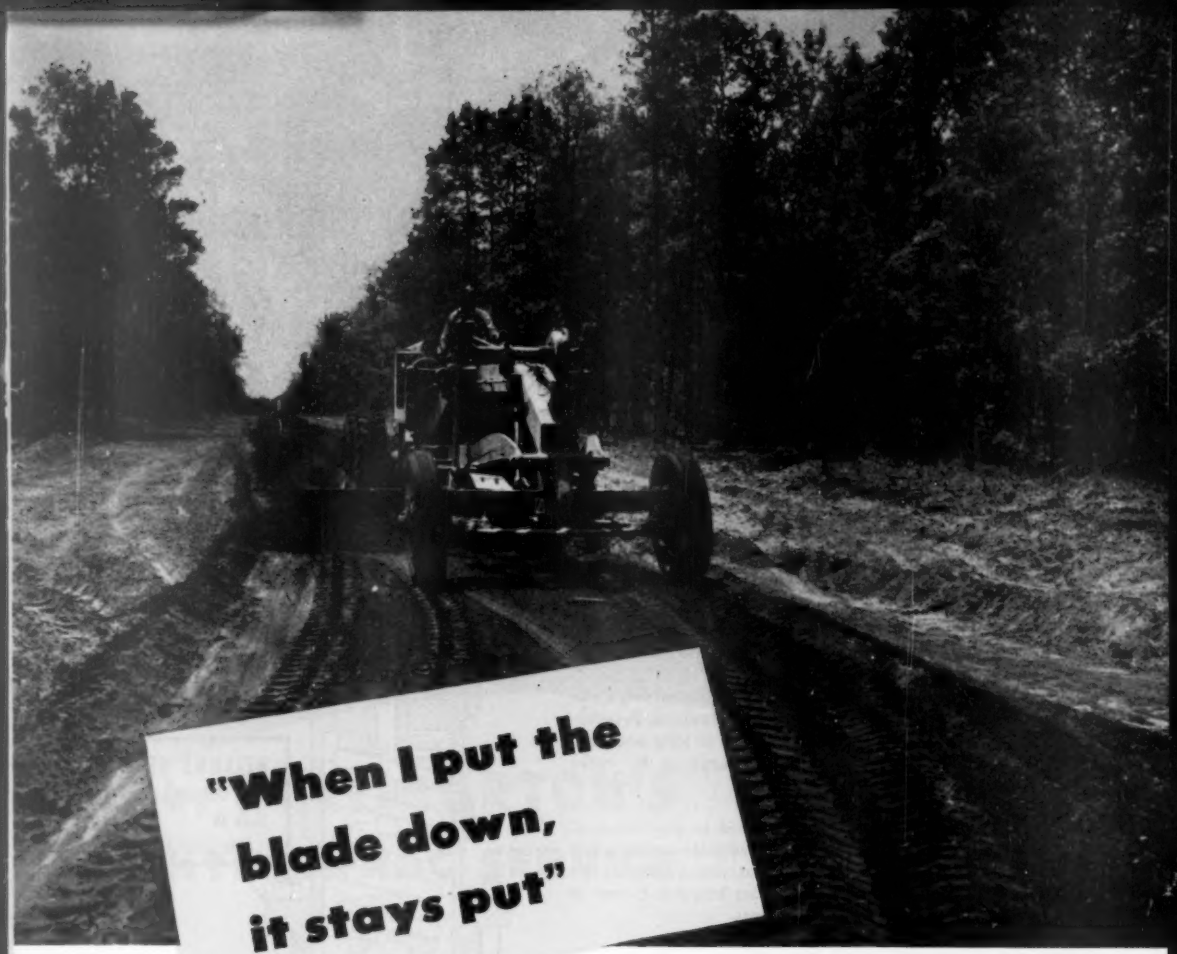

"When I put the blade down, it stays put"

Roy W. Morton, operator of a Caterpillar No. 12 Motor Grader, likes his partner-in-work.

"When I put the blade down on a Caterpillar," he explains, "*it stays put.*"

That single statement speaks volumes for the years of engineering research and quality materials which are incorporated in every Cat Motor Grader. They point to one objective: keep the blade where the operator wants it.

In the picture, Mr. Morton is spreading oil mix surface on a 2-mile access road to a new wildcat oil well near Hawkins, Texas. The motor grader is owned by L. W. Pelphrey Co. of Gladewater, Tex.

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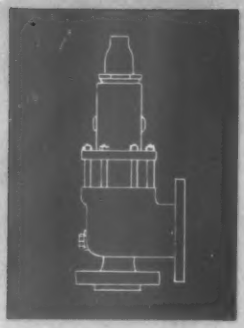

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CORROSIVE LIQUIDS OR GASES cannot attack the spring and guiding surfaces between the disc guide and disc in these Consolidated Safety Relief Valves. The BELLOWS SEAL encloses them in an armor of stainless steel — protects these vital parts against corrosion — assures continuous, dependable valve operation. Because the bellows is long and soft, you can be certain of optimum performance of the valve in service.

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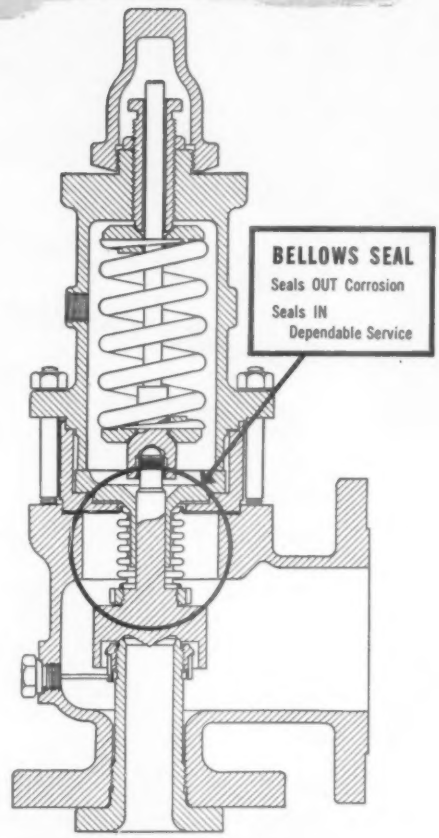
BELLOWS SEALED Consolidated Safety Relief Valves have every other superior design and construction feature to assure continuous, economical performance at their rated capacities. Get all the facts about their quality and "safety-first" dependability.



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CONSOLIDATED SAFETY RELIEF VALVES

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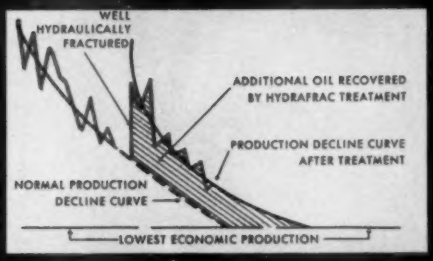
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LOWEST ECONOMIC PRODUCTION

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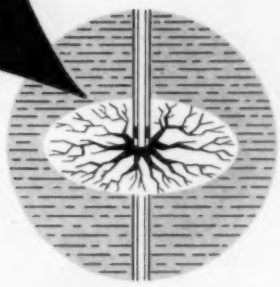

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YEARS AHEAD IN PRODUCTION IMPROVEMENT TECHNIQUES!

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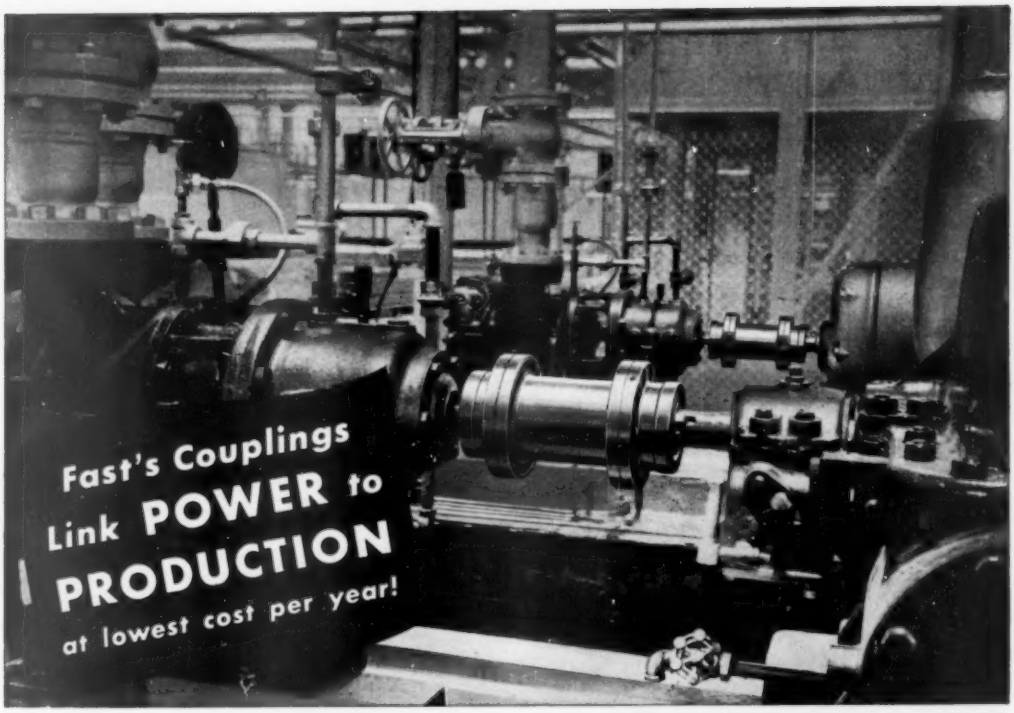

Every major producer of high-speed equipment uses FAST'S Couplings!

HIGH-SPEED equipment demands components with superior strength, accurate manufacture, long-lasting dependability. That's why it's important to *you* that Fast's Couplings are selected by every major high-speed equipment producer!

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For full details on Fast's Couplings and Koppers Engineering Service, write today for your free copy of our catalog. Send to: KOPPERS COMPANY, INC., *Fast's Coupling Dept.,* 282 Scott St., Baltimore 3, Maryland.

Here's How FAST'S Save You Money

Free Service—Koppers free engineering service assures you the right coupling for the job.

Rugged Construction—Fast's still maintains its original design, without basic change or sacrifice in size or materials. Result: freedom from expensive coupling failures.

Lowest Cost per Year—Fast's Couplings usually outlast equipment they connect. Their cost may be spread over many years!

KOPPERS

FAST'S
THE ORIGINAL
GEAR-TYPE
Couplings

INDUSTRY'S STANDARD FOR 32 YEARS

KOPPERS COMPANY, INC., ***Fast's Coupling Dept.***
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Gentlemen: Send me Fast's Catalog which gives detailed descriptions, engineering drawings, capacity tables and photographs.

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Company _____

Address _____

City _____ Zone _____ State _____

Long-lasting Stainless Steel

reduces maintenance at Gulf's Lube Oil Phenol Extraction Plant

IN job after job, Stainless Steel repeatedly has demonstrated its ability to reduce maintenance and resulting downtime through its excellent resistance to corrosion and other severe conditions so often encountered in the petroleum industry.

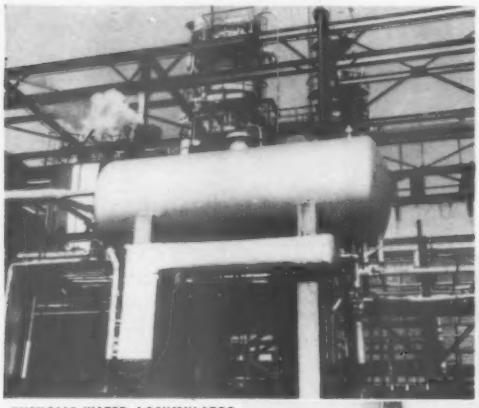
For example, in the Lube Oil Phenol Extraction Plant (Multisol No. 3) at Gulf Oil Corporation's Port Arthur, Tex., operation, three specific installations of Stainless Steel have played an important role in reducing over-all downtime.

The phenolic water accumulator—handling a solution of 10% phenol and some naphtha—is lined with Stainless Steel $\frac{3}{64}$" thick and 12" wide. It has been in service for nine years and remains in good condition, although carbon steel plates used previously blistered after two years of service. The vessel operates at a pressure of 5.0 psi and at 170°F.

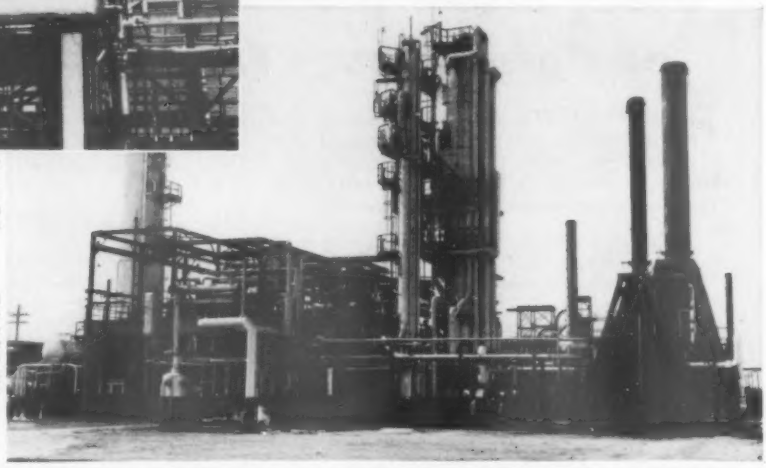
In the extract heating furnace, the last 16 tubes are Stainless Steel and have been in service for $7\frac{1}{2}$ years without need for maintenance. Carbon steel tubes in these locations failed after 18 months of service.

The drier section of the phenol tower itself is lined with Stainless Steel as a protection against rapid corrosion at tray level.

There are many locations in your plant where the proper grade of Stainless Steel can help you maintain uninterrupted production. Our metallurgical and research personnel will be glad to assist you with recommendations. There is no obligation, of course.



PHENOLIC WATER ACCUMULATOR is lined with Stainless Steel. The Stainless lining has lasted nine years—against two years for carbon steel—and is still in serviceable condition.



OVER-ALL VIEW of Lube Oil Phenol Extraction Plant (Multisol No. 3) at Gulf Oil Corporation, Port Arthur, Tex. The phenol tower is in the center and the extract heating furnace at the right. Both are equipped with Stainless Steel.

UNITED STATES STEEL CORPORATION, PITTSBURGH · AMERICAN STEEL & WIRE DIVISION, CLEVELAND · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
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SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

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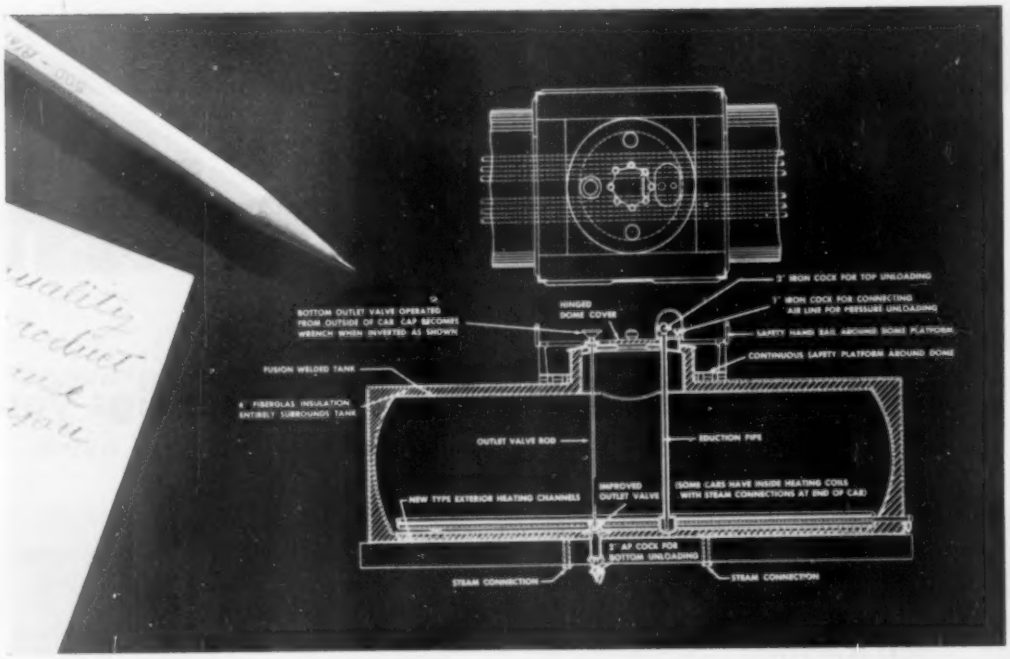
UNITED STATES STEEL

MODERN TANK CARS MAINTAIN HIGH QUALITY OF DOW CAUSTIC SODA FROM PLANT TO YOU

Special design permits safe, fast shipment and convenient unloading


BOTTOM OUTLET VALVE OPERATED FROM OUTSIDE OF CAR. CAP BECOMES WRENCH WHEN INVERTED AS SHOWN
HINGED DOME COVER
2" IRON COCK FOR TOP UNLOADING
1" IRON COCK FOR CONNECTING AIR LINE FOR PRESSURE UNLOADING
SAFETY HAND RAIL AROUND DOME PLATFORM
CONTINUOUS SAFETY PLATFORM AROUND DOME
FUSION WELDED TANK
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IMPROVED OUTLET VALVE
(SOME CARS HAVE INSIDE HEATING COILS WITH STEAM CONNECTIONS AT END OF CAR)
3" AP COCK FOR BOTTOM UNLOADING
STEAM CONNECTION
STEAM CONNECTION

All of Dow's caustic soda shipping points throughout the country maintain a large fleet of modern tank cars.

Each of these Dow owned cars is insulated, protectively lined and fitted with nickel heating coils. They are equipped to permit unloading from the top or bottom by air pressure or pump. There are frangible discs or safety valves to prevent possible injury to workers from excessive air pressure and they have protective plug cocks on the bottom outlet leg.

When you order caustic soda solution from Dow, regardless of whether shipment is made from Dow's three large plants at Midland, Michigan, Freeport, Texas and Pittsburg, California or from terminals at Carteret, New Jersey; Charleston, South Carolina or Los Angeles, California, you can be certain of dependable delivery of high quality caustic. All tank cars are expertly maintained and thoroughly washed and inspected before every loading. Caustic soda 48-50% solution and 71-73% solution are delivered in 8,000 and 10,000 gallon tank cars.

The next time you buy caustic soda, whether it is solution, solid, flake or ground flake, buy from Dow. Write for Dow's CAUSTIC SODA HANDBOOK for complete unloading, handling and product information. Wherever you are, you're close to Dow caustic soda. THE DOW CHEMICAL COMPANY, Midland, Michigan.

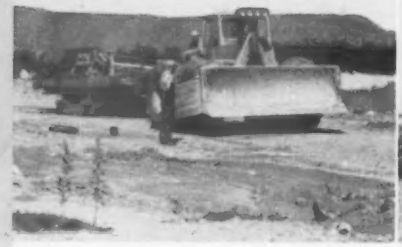
you can depend on DOW CHEMICALS

DOW

Tournatractor

rubber-tired tractor...

19 m.p.h.
186 h.p.



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Clears drill sites

Pulls Scrapers, Rollers, Rooters

Backfills pipelines, culverts

Why crawl when

with speedy, rubber-tired LeTourneau rigs you...

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7-yard (9-ton) scraper...

28 m.p.h.
122 h.p.

Self-loads to dig slush pits, etc.

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Crosses curbs, tracks, without planking

Drives over highways job-to-job

Handles emergency dozing

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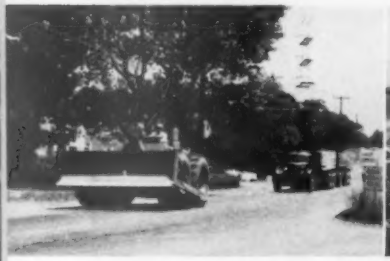
Builds fire walls

Drives anywhere job-to-job



With crane, lifts up to 14 tons

With V-type snow plow, busts any drift!

you can RUN?

- **move more dirt on both short hauls and long**
- **make fast self-powered moves between jobs**

Builds, gravels access roads

Earns profit on rental to contractors

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Scraper interchanges with rear-dump

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Company .....

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City..... State.....

☐ *Would like demonstration on my location.*

DPD-154-RR-G-ol

The finest welding fittings available are made from seamless steel tubes forged in Globe's Foren Mill . . . the only one of its kind in the entire Steel Tube Industry.

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Only Globe seamless welding fittings are precision processed from *billet*...to *tube*...to *fitting*

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The exacting controls in Globe's precision process — plus specialized research, testing and engineering insure uniform high-quality and close tolerances. Be sure of dependable fittings . . . always specify Globe.

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Producers of Globe seamless stainless steel tubes — Gloweld welded stainless steel tubes — alloy — carbon — seamless steel tubes — Globeiron (high purity ingot iron) seamless tubes — Globe Welding Fittings.

For complete information on the finest welding fittings available anywhere, send for the Globe Welding Fittings Catalog.

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They had bugs in their bonnets

—but they sired a new champion

Along with early models of blowout preventers, Christmas trees and other oilfield products that have helped to establish Cameron as the *world leader in pressure control,* ancestors of the Non-Lubricated Lift Plug Valve are also proudly displayed in our own private hall of fame.

Each of these predecessors made a worthwhile contribution to the unique valve which is proving itself the champion for all sorts of difficult services in petroleum, chemical and process industries.

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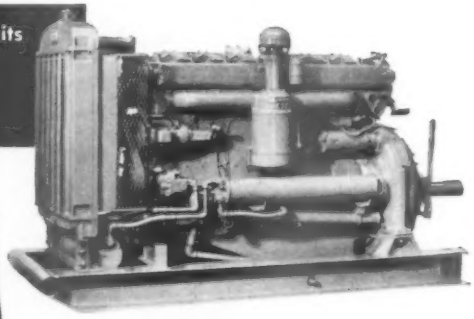
you will find MURPHY DIESEL
sales, parts and service facilities
convenient, prompt and dependable

Engines and Power Units
Generator Sets
Mech-Elec Units
90 to 240 H.P.
60 to 140 K.W.



Genuine Factory Engineered Parts
Strategically located stocks of genuine Murphy Diesel parts minimize down time for repair or overhaul

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Factory Trained Service Specialists
Dealer servicemen are trained in the newest and best service techniques right in the Murphy factory

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They Say—

Action Needed Now

"Since the end of World War II the petroleum industry has not only met an increasing demand but has developed a reserve producing capacity of approximately 1,000,000 bbl. per day in excess of current high rates of production.

"If we are to continue to maintain this excess productive capacity, which is the minimum required for the national defense and a healthy domestic economy, it is imperative that the President and the Congress act speedily to make offshore lands available for development.

"These offshore reserves have no value either to the national defense or our domestic economy unless and until they have been proven and developed. Further delay in exploring and developing these reserves in order that they may be available in times of emergency might well endanger our national security."

Statement of Frank Porter, president, American Petroleum Institute.

Outlook for Instruments

"In the process industries—historically the most prolific users of instrumentation—capital expenditures during 1952 will total about $13 billion. If all of these plants were automatized, over $700 million would have been spent for measuring and controlling instruments. The fact is that the 1952 production of these instruments will slightly exceed only 10 per cent of this potential."

Henry F. Dever, president, Brown Instruments Division, Minneapolis-Honeywell Regulator Co.

New Dimensions in Conservation

Sir:

Your editorial of January 12 to the effect that if wide spacing cuts costs, it is properly conservation, impressed me . . .

To carry the thought a little further, it seems to me that conservation of natural resources has actually expanded into a new dimension—the conservation of steel, of money, and of man-hours.

I know, of course, that the Texas Railroad Commission and other petroleum conservation agencies have to justify their decisions within the statutes under which they exercise their authority. The statute says nothing about steel, money, and man-hours. But in what Justice Oliver Wendell Holmes might describe as the outer periphery of judicial reasoning, these matters could properly influence the decision. With American steel companies hunting for iron ore in the frozen Arctic and tropical Africa and the general usefulness of saving money, conservation is surely running into new dimensions.

Samuel B. Pettengill
Pure Oil Co.
Chicago.

Major-Policy Board Emerges

"The decision of the National Security Council of the United States to withdraw a criminal suit against major American oil companies charging violation of the antitrust laws has made news for two reasons:

"It can end the long feud between oil companies and the government as soon as the Department of Justice and the company attorneys can agree on the terms. It may contribute to a resolution of the Iranian oil crisis by clearing the way for marketing Iranian oil by an internal oil combine involving both Anglo-Iranian and the big United States companies.

"The move is important for another and hardly noticed reason. This was the first time that a major decision of high policy in the American Government has been presented openly and

here's why it's needed

Overheated jacket cooling water or lubricating oil pressure failure can develop anytime . . . and it can happen to the best engine! When this happens, serious engine damage will occur. To prevent such costly damage, engines need the protection given by PENN Safety Controls.

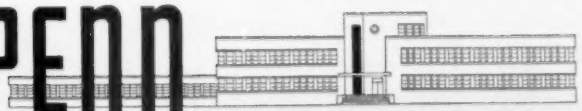
a "MUST" for your engines

here's how it works

If water temperature rises beyond the predetermined safe point . . . or if oil pressure falls too low . . . the PENN Safety Control goes into action. It automatically sounds an alarm, flashes a warning light or stops engine operation . . . whichever you choose. Then, the fault can be investigated and corrected before serious damage develops.

Learn more about this *low-cost* protection for *new and old engines.* Write **Penn Controls, Inc., Goshen, Indiana.** Export Division: 13 E. 40th Street, New York 16, N. Y., U. S. A. In Canada: Penn Controls Limited, Toronto, Ont.

PENN



AUTOMATIC CONTROLS

FOR HEATING, REFRIGERATION, AIR CONDITIONING, GAS APPLIANCES, PUMPS, AIR COMPRESSORS, ENGINES

publicly as a decision by the National Security Council. Another way of stating it is that this is the first public emergency of a little known but extremely important policy making agency of the American Government."

Joseph C. Harsch, writing in the Christian Science Monitor.

High Taxes and Incentive

"Much has been said about taxes and the need for them in national emergency. If there were a choice between incentives for business and abandoning essential Government work, the decision would be at least uncertain. But there is no such issue. Crushing taxation in the upper brackets has little effect upon the rates which those at the lower levels must pay.

"Without attempting to prophesy, I look upon diminishing incentive as perhaps the most serious possibility now facing business. If financial reward is absent, or is greatly reduced, the number of candidates for management positions will decrease. And business will be that much less able to fulfill its responsibilities to the nation."

Crawford H. Greenewalt, president, E. I. du Pont de Nemours & Co., Inc., addressing the Sixth Annual Forecasting Conference, Chamber of Commerce of Greater Philadelphia.

"What safety tool do I use?
"Give me Berylco tools every time. I'll tell you why. In order to make some of the other tools as strong as beryllium copper, they make 'em twice as big. No matter how good a mechanic you are, you feel as though you had ten thumbs."

Berylco safety tools are made of high-performance beryllium copper. That means that they are not only nonsparking, noncorrosive and nonmagnetic, but much stronger than tools made of other safety materials.

In addition to their added safety factor, Berylco tools compare favorably with the quality you expect in steel tools. They're hard and tough. They retain their cutting edges, and they last a long time.

Berylco Safety Tools are widely distributed through jobbers. Write for the name of the one nearest you — and for a complete, illustrated catalog.

BERYLCO THE BERYLLIUM CORPORATION

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CALENDAR

FEB.

5- 7 Missouri Petroleum Association convention, President Hotel, St. Louis.

12-13 Western Petroleum Refiners Association, regional technical-industrial relations meeting, Hotel Beaumont, Beaumont, Tex.

16-21 American Institute of Mining and Metallurgical Engineers, annual joint meeting of petroleum, metals, and mining branches, Statler Hotel, Los Angeles.

18 Instrument Society of America, sixth annual New York regional meeting, Hotel Statler, New York.

18-19 Pacific Coast Gas Association, technical services conference of technical section, Hollywood, Calif.

27 Natural Gasoline Association of America, regional meeting, Scharbauer Hotel, Midland, Tex.

MAR.

2- 6 American Society for Testing Materials, spring meeting, Statler Hotel, Detroit.

4- 6 American Petroleum Institute, division of production, Southwestern district spring meeting, Hilton Hotel, Fort Worth.

8-11 American Institute of Chemical Engineers, Buena Vista Hotel, Biloxi, Miss.

15-20 American Chemical Society, petroleum division, spring meeting, Statler Hotel, Los Angeles.

16-20 National Association of Corrosion Engineers, ninth annual conference and exhibition, Hotel Sherman, Chicago.

18-20 American Petroleum Institute, division of production, Mid-Continent district meeting, Mayo Hotel, Tulsa.

23-25 Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, Tex.

23-26 American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, and Society of Exploration Geophysicists, joint annual meeting, Sam Houston Coliseum, Houston.

23-27 Western Metal Exposition and Congress, technical sessions, Statler Hotel, Los Angeles.

25-27 Society of Automotive Engineers, national production meeting, Hotel Statler, Cleveland.

28 North Texas Oil and Gas Association, annual meeting, Kemp Hotel, Wichita Falls, Tex.

30-31 Texas Independent Producers and Royalty Owners Association, annual meeting, San Antonio.

30-Apr. 1 Mid-West Gas Association, Broadmoor Hotel, Colorado Springs, Colo.

APR.

7- 9 Petroleum Industry Electrical Association, annual convention and exhibit, Shamrock Hotel, Houston.

8-10 American Petroleum Institute, division of production, Eastern district meeting, William Penn Hotel, Pittsburgh.

15-17 National Petroleum Association, midyear meeting, Cleveland.

20-22 American Petroleum Institute, Division of Transportation, products pipe-line conference, Hotel Muehlebach, Kansas City.

21 Association of Consulting Chemists and Chemical Engineers, Inc., Hotel Belmont Plaza, New York City, symposium and dinner.

21-23 Southwestern Gas Measurement Short Course University of Oklahoma, Norman.

Hole for Sale . . .

AT LOW COST

Drilling contractors everywhere are finding that the hole they drill costs less when it is drilled with **REED** Twin-Blast Rock Bits.

Slush from Twin-Blast nozzles blasts cuttings up into the return mud stream before they can be recycled. Cutters are always working on new formation, instead of grinding up pieces that have already broken loose.

The result is faster drilling, more footage per bit and lower cost per foot of hole.

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ROCK BITS

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The engineering skill and creativeness of Pyrene are at your command. Pyrene built-in systems are custom made for the installations they guard. And Pyrene engineers have the habit of coming up with the *one* best solution to every fire-protection problem. Write today for comprehensive Pyrene Air Foam data.

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22-24	American Association of Petroleum Geologists, Rocky Mountain section meeting, Casper, Wyo.
24-25	Interstate Oil Compact Commission, spring meeting, Roosevelt Hotel, New Orleans.
26-29	American Institute of Chemical Engineers, Chemical Institute of Canada, joint meeting, Royal York Hotel, Toronto, Ont.
27-28	Independent Petroleum Association of America, mid-year meeting, Jefferson Hotel, St. Louis.
Apr. 29-May 1	Natural Gasoline Association of America, annual convention, Rice Hotel, Houston.
Apr. 30-May 1	American Gas Association, transmission and storage conference, Edgewater Beach Hotel, Chicago.

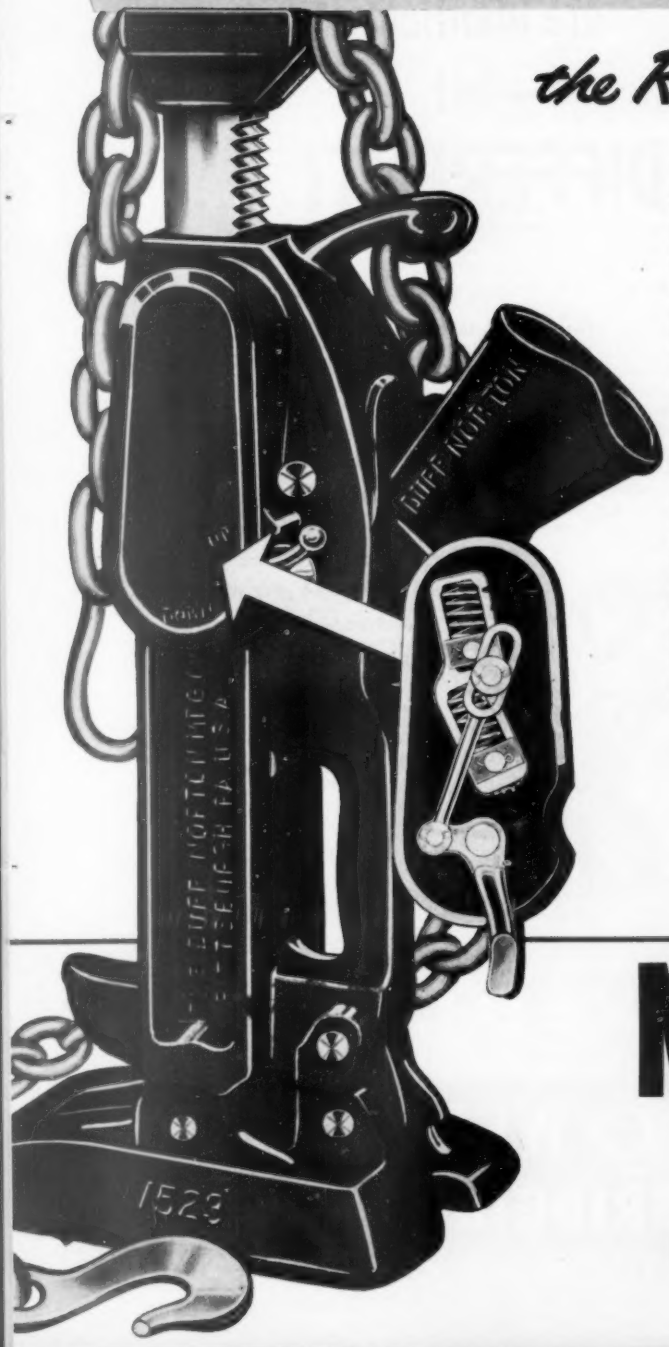
MAY

4- 5	American Petroleum Institute, division of marketing, midyear meeting, Baker Hotel, Dallas.
6- 8	American Society of Training Directors, ninth annual conference, Sheraton Plaza Hotel, Boston.
7- 8	American Petroleum Institute, Rocky Mountain district, Division of Production, spring meeting, Gladstone Hotel, Casper.
11-13	Southern Gas Association, Jung Hotel, New Orleans.
11-14	American Petroleum Institute, Division of Refining, midyear meeting, New York.
13-14	Pacific Coast Gas Association, annual gas supply and transmission conference, Santa Barbara, Calif.
14-23	International Petroleum Exposition, Tulsa.
15-46	International Gas Union, council meeting, Paris, France.
24-27	American Gas Association, production and chemical conference, Hotel New Yorker, New York City.
25-29	American Society of Mechanical Engineers, annual conference and exhibit, oil and gas power division, Hotel Schroeder, Milwaukee.
28-29	Western Petroleum Refiners Association, regional technical-industrial relations meeting, Broadview Hotel, Wichita.
28-29	Natural Gas and Petroleum Association of Canada, London, Ont.

JUNE

2- 3	American Petroleum Institute, Division of Production, Pacific Coast District, Statler Hotel, Los Angeles.
4- 5	Kentucky Oil and Gas Association, annual meeting, Lafayette Hotel, Lexington, Ky.
7-12	Society of Automotive Engineers, summer meeting, The Ambassador and Ritz-Carlton Hotels, Atlantic City, N. J.
14-18	Canadian Gas Association, Windsor Hotel, Montreal, Canada.
15-19	American Petroleum Institute, Division of Production, midyear committee conference, Hotel William Penn, Pittsburgh.
16-19	American Welding Society, national spring technical meeting, Shamrock Hotel, Houston.
18-19	Western Petroleum Refiners Association, regional technical-industrial relations meeting, Conrad Hilton Hotel, Chicago.
18-19	Pennsylvania Grade Crude Oil Association, annual meeting, Hotel William Penn, Pittsburgh.
JUNE 29-JULY 3	American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

Why this special oil field jack will give longer trouble-free service



the Roustabout "1523"

When Duff-Norton engineers set out to design safer, longer-lasting jacks for men who work in the oil fields, they discovered one startling fact—about 90% of jack maintenance was in replacing worn springs in the mechanism that controls the jack's raising or lowering action. Result? The Duff-Norton Roustabout "1523" oil field jack is equipped with a patented*, adjustable spring mechanism which assures positive engagement of rack teeth. The spring's tension can be easily adjusted with a screw driver without removing any part of the jack. Should the spring eventually lose its resiliency, there's no need to send the jack to a repair shop. A new, complete spring mechanism assembly can be quickly installed by anyone in a matter of minutes right in the field, making the jack as good as new!

Complete with detachable steel chain, this versatile jack can be operated at any angle at its full 15-ton capacity. Ask your supply store salesman for the Duff-Norton Roustabout "1523." He has it in stock or can get it for you quickly. For complete specifications on this and other dependable Duff-Norton jacks, write the world's oldest and largest manufacturers of lifting jacks for special Oil Field Jack Bulletin AD19B, The Duff-Norton Manufacturing Co., P. O. Box 1889, Pittsburgh 30, Pa. Canadian Plant—Toronto 6, Ontario.

"Giving Industry A Lift Since 1883"

DUFF-NORTON *Jacks*

These Twins are Identical —but DIFFERENT!

The difference lies in the material. On the left is a MAGNESIUM Plug, which drills out in 1 to 3 hours: the one on the right is cast iron, which will outlast the casing on permanent installations, but still drills out in 4 to 6 hours. Otherwise, they're identical. Both run fast through fluid, set easily and quickly right where you want them, and give *positive, leakproof packoff* against high differential pressures.

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Ask Your Lane-Wells Man!

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DRILLABLE BRIDGING PLUGS

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JOURNAL
TULSA, OKLAHOMA

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JOURNALLY Speaking

Twice as Big as Life

THE old saying "as big as life and twice as handsome" has to be modified in our case. We're twice as big as Life and (we think) every bit as handsome. What we mean is that our favorite oil publication carried twice as many pages of advertising last year as Life magazine ran.

Yup, it's true: The Big Yellow Book is still the biggest thing in the publishing world. Our authority is Advertising Age magazine, which makes a business of keeping track of such things. According to its annual compilation, The Oil and Gas Journal carried 7,626 pages of advertising in 1952. That is more than we carried the year before, and more than any other publication of any kind ever carried since records have been kept. So for the fourth successive year we're the biggest magazine in the world—not in circulation, of course, but in number of pages printed.

We have trouble making people believe that. They think there must be a catch to it somewhere, and that maybe we mean just the biggest oil magazine, or the biggest magazine with yellow covers, or something like that. But there's no catch to it. We're the biggest, period. You often see monthly magazines thicker than the Journal, but remember there are only 12 of them in a year compared with our 52 issues.

Another thing most people don't realize is that business magazines as a whole carry more advertising than popular magazines. The runner-up in 1952 was Iron Age (with 7,335 pages), and next in rank were American Machinist, Steel, Business Week, Florist's Review, Engineering News-Record, Electronics, Electrical World, and Product Engineering—the ten top mediums all business papers. Eleventh on the list is Saturday Evening Post with 4,194 pages of advertising last year. It is followed by three more business publications and then comes the New Yorker with 3,894 pages and —No. 16—Life magazine with 3,815, or just half the Journal's tally.

The fact that business publications carry more advertising than popular magazines shows how big a market is presented by business and industry for supplies and equipment. The fact that an oil publication leads them all shows how much buying the oil industry does. There is one other fact worth mentioning: Last year the Journal carried more advertising than the total of the next three oil publications combined. What this shows we are too modest to point out.

Push-Button Oil

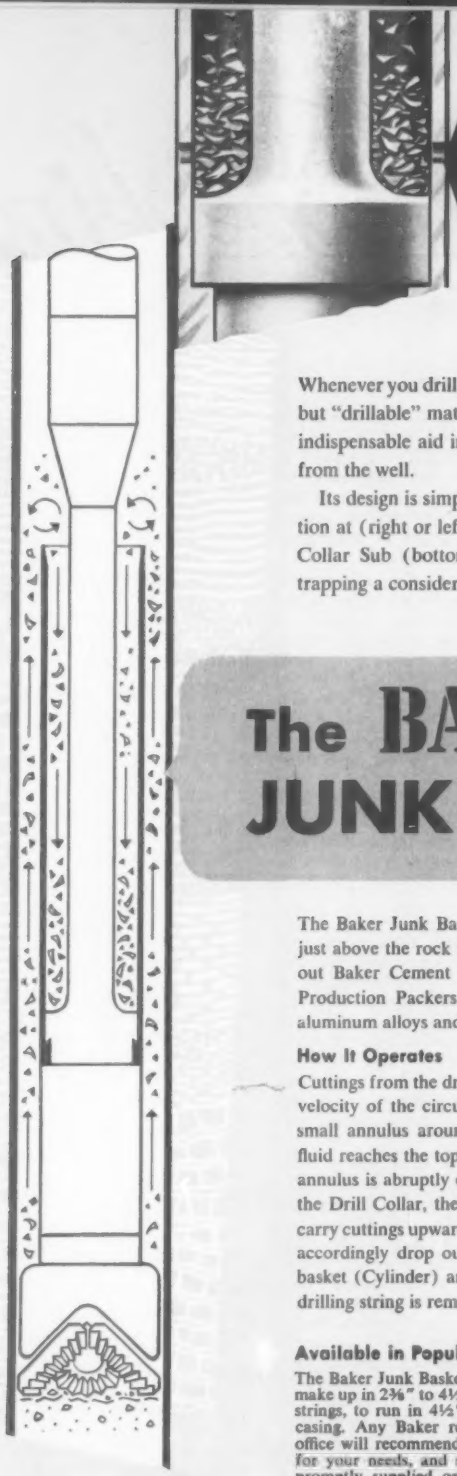
FOR years the military strategists have been dreaming of push-button warfare—push a button and a secret weapon destroys the enemy. Something akin to that is developing in the oil industry.

You can't exactly produce oil by pushing a button—at least not yet. But push buttons are fast displacing pencil pushers, and with them—and the electronic gadgets behind the buttons—the industry is learning how to produce more oil at lower cost.

Some of the ways this is being done are explained in a series of special articles in this issue. Most people have heard something about "mechanical brains" that can work intricate mathematics problems quicker than you can say "electronics," but very few know much about how they operate or all the ways they can be used. You still won't know after reading these articles, but you will have some idea of how they can be put to use in speeding up many typical jobs in the oil industry.

Wherever there's figuring to be done—and there's getting to be more and more of it in this business—these robot computers can beat a roomful of accountants or engineers hands down. The only trick is knowing how to set up the machines and feed the dope into them. And this requires a combined knowledge of electronics, higher mathematics, and advanced accounting. Thus the industry is in need of a new profession—expert button pushers.

Henry D. Ralph.



A "Booby Trap" for metal cuttings

Whenever you drill out cast iron, aluminum alloys, bronze, or other dense, but "drillable" materials, the improved Baker Junk Basket will prove an indispensable aid in trapping and retaining the cuttings for safe removal from the well.

Its design is simple, and readily understood by referring to the illustration at (right or left). Between the short Drill Collar (top) and the Drill Collar Sub (bottom) a Cylinder is mounted to provide a basket for trapping a considerable quantity of metal cuttings.

The BAKER JUNK BASKET

The Baker Junk Basket (Product No. 4281) is positioned just above the rock bit, or diamond point bit, when drilling out Baker Cement Retainers, Baker Bridge Plugs, Baker Production Packers, or other devices made of cast iron, aluminum alloys and similar "drillable" materials.

How It Operates

Cuttings from the drilling bit are carried upward by the high velocity of the circulation fluid through the comparatively small annulus around the Cylinder. When the circulation fluid reaches the top of the Cylinder, where the area of the annulus is abruptly enlarged due to the smaller diameter of the Drill Collar, the velocity of the fluid—and its power to carry cuttings upward—is greatly reduced. The metal cuttings accordingly drop out of the circulation fluid and into the basket (Cylinder) and are trapped and recovered when the drilling string is removed.

Available in Popular Sizes

The Baker Junk Basket is furnished to make up in 2⅜" to 4½" A.P.I. drilling strings, to run in 4½" to 9⅝" A.P.I. casing. Any Baker representative, or office will recommend the proper size for your needs, and see that you are promptly supplied on a rental basis. Specifications for purchase by over-seas operators can be found in the BAKER (or Composite) CATALOG.

BAKER OIL TOOLS, INC.
HOUSTON • LOS ANGELES • NEW YORK

Here's why drilling is not increasing much

IT takes more than steel to drill 50,000 wells a year. That is the Government's goal for building up a reserve crude-producing capacity.

Last year the industry drilled 45,840 wells, and the blame for falling short of the goal is generally laid to a shortage of tubular goods. For the current year the Journal's annual survey forecasts 46,230 completions, and anticipation of a steel shortage is not the principal reason for missing the Government's goal again. Neither is it a shortage of manpower, rigs, or other materials, nor is it a shortage of patriotism.

THE basic shortage is money. This is hard to explain in the face of the oil industry's stable and prosperous position, and its good earnings record in recent years. But it is true.

The expression most commonly used by oil operators in discussing this situation is that they are running out of places to drill. This also is difficult to explain, because it is well known that there are many large areas which have favorable prospects for oil production but which are virtually untouched by the drill.

WHAT is meant is that the oil industry is running out of places to drill *profitably*. In the oil industry of today, profit must be figured on the long range. And in the long view a good deal of the drilling being done today is likely to be unprofitable.

The elements of profit, of course, are costs and markets. Costs are continuously going up, both absolutely and in relation to volume of production. Wells are getting deeper and more expensive. Worse, the production of many wells is too small to pay out at current or anticipated market prices. Too many wells which are listed in the statistics as successful completions are being quietly capped and abandoned as noncommercial.

Nor is there much in the current picture to give operators much hope of price increases which would cover rising costs and turn submarginal wells into profitable producers. The reserve producing capacity which the Government wants for national defense is in itself a threat to higher prices, and the threat is compounded by the trend toward continually higher imports.

THIS is probably the biggest problem facing the oil industry today—how to finance the drilling of wells (and the construction of other facilities) beyond the volume requirements of the market and beyond the financial return which can be expected from the market.

Unless the industry and the Government can evolve an answer to this problem, all the steel in the world won't induce operators to drill wells that have little prospect of payout.

Control

Nothing takes the place of the Driller's know-how . . . but as an aid to know-how, the driller has the benefit of precision instruments and modern equipment, to *control* operations and assure successful, trouble-free completions.

Same thing applies to cement: The Burner, for example, with his long years of experience, has the most modern devices at his finger tips, to *control* his operation and assure the production of cements with the uniformly high quality that means trustworthy performance . . . cements that produce trouble free cementing jobs when the casing is swung into place.

LONE STAR CEMENT CORPORATION

Offices: DALLAS • HOUSTON • ABILENE, TEX.
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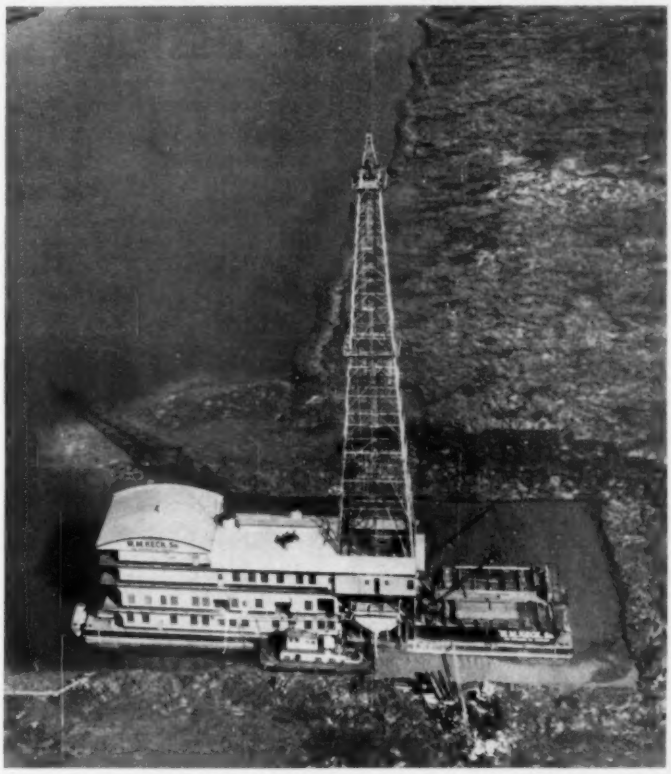
SELECT CEMENT TO FIT THE JOB

THIS WEEK

INDUSTRY. — Development of new sonic oil-well pump announced by California developer following 9-month field test. . . . Technique uses sound waves to elongate and contract rapidly the tubing string, propelling the fluid upward. . . . ¶Latest Du Pont survey shows 50-city average octane rating is up to 90.8 for premium and 84.3 for regular, representing sizable increase over the past year. . . . ¶Sinclair takes over 38,000-ton Petro Kure, world's largest tanker, for use between Venezuela and the East Coast. . . . Three sister tankers also to be built. . . . Ships carry about 278,000 bbl. of crude. . . .

INTERNATIONAL. — Turkish Government lets $7,330,000 contract for construction of a 6,250-bbl. refinery in the country's southeastern oil-producing region to Ralph M. Parsons, Los Angeles. . . . ¶Series of auctions now going on in Lima, Peru, to untangle the maze of overlapping and duplicating applications for concession acreage under the country's new oil law. . . . ¶Ground-breaking ceremony held at Kwinana in western Australia to mark start of construction of Anglo-Iranian's new 100,000-bbl. refinery. . . . ¶Conorado Petroleum gets exploration rights on 36,000 sq. miles in British East African Protectorate of Somaliland. . . . ¶Britain lifts restrictions after 13½ years to permit return of premium-grade gasoline to the market. . . .



FOUR-DECK DRILLING BARGE has gone to work for Superior Oil Co. in the inland waters of southeastern Louisiana. The barge, the largest in the world, last week was on location in Four Isle field of Terrebonne Parish and was below 11,000 ft. on its first hole. Described as the most up-to-date drilling barge, in addition to being the largest, the new vessel mounts the rig with which Superior set a new world's drilling-depth record in 1949 in Sublette County, Wyoming. An article describing the new barge will appear in the February 9 issue of the Journal. (Photo courtesy Levingston Shipbuilding Co.)

GOVERNMENT.—Grand jury investigation of FTC's cartel charges against the oil industry are delayed another 3 months. . . . Court orders extension of time to give new attorney general time to study case. . . . ¶PAD announces allocation of 309,372 tons of casing and tubing for second quarter to 1,695 operators. . . . ¶Interior Affairs Committee announces it will open new hearings on tidelands legislation within 2 weeks. . . . Hearing will be the fourteenth since 1938. . . .

ACTIVITY.—Production of crude and lease condensate averaged 6,488,400 bbl. daily for week ended January 24, down 27,850 bbl. daily. . . . ¶Total well completions gained 20 wells for the week to 916. . . . Wildcat completions totaled 225 wells compared with 230 a week earlier and 189 in the same week last year. . . . ¶The fifth straight weekly drop in number of rotary rigs operating in United States brought the total down to 2,439 on January 27. . . .

REFINING.—Refiners warned by A.I.E.E. speaker to keep an eye on cathodic protection insulation as a possible fire hazard in refineries during electrical storms. . . . Insulation flanges in piping systems designated as potential culprits. . . . ¶Continental Oil Co. nearing completion of expansion and modernization program at Lake Charles, La., refinery. . . . Crude capacity of the plant will be almost quadrupled to 45,000 bbl. daily. . . . ¶New trend in maintenance, Cleveland plant-maintenance conference develops, is a turn from centralized craft control toward greater adoption of zone system. . . .

PIPE LINES.—Arkansas Legislature gets bill levying a tax ranging from $10 to $75 a mile on product and natural-gas lines over 75 miles long. . . . Tax would range from $10 on lines 12-in. and smaller up to $75 for lines over 26 in. . . . ¶Kansas-Nebraska Natural gets authorization to expand its system in Kansas and Nebraska. . . .

PRODUCTION.—New strike by Twin Oil Co. northeast of Denver may extend Denver-Julesburg basin production into central and deeper portion of basin. . . . Well is southwesternmost indicated production of major trend in basin. . . . ¶Louisiana allowable for February set at 698,817 bbl. daily, a slight increase over January. . . . Kansas allowable left unchanged at 325,000 bbl. daily. . . . Oklahoma allowable set at 539,029 bbl. daily, unchanged from January and December. . . . New method of setting allowable adopted in Kansas. . . .

Sonic Pump Successful

Check valves at each joint of sound-oscillated tubing pump oil in new technique; operation proved in 9-month test run

D. H. Stormont

LOS ANGELES. — A revolutionary type of oil-well pump in which sound waves are used as the means for lifting fluids has undergone successfully a 9-month field trial in a 1,000-ft. well near Bakersfield.

During this period the sound-powered pump lifted about 500 bbl. of fluid daily through 800 ft. of tubing at a moderate operating rate. Aside from down time for occasional changes to determine the effect of variables, the pump has been running continuously since being installed.

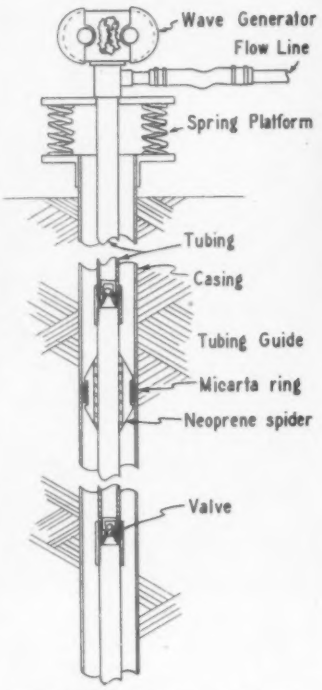
The sonic pump, so-named because sonic concepts are used extensively in the design and understanding, utilizes sound waves resonated at some standing wave overtone. These resonant conditions cause regions of the tubing string alternately to elongate and contract in rapid succession. Check valves, installed at each tubing joint propel fluid in the well upward with each oscillation. Thus, the entire tubing string, in effect, is the pump.

The fluid pumped in the Kern River field tests was 98 per cent water containing a relatively high sand content. The crude was of low gravity. Prime mover employed was a conventional multicylinder gas engine. When producing at the 500-bbl. rate, over-all mechanical efficiency of the lifting operation was about 60 per cent.

As a result of the field tests, which were conducted by Standard Oil Co. of California, prototype designs for various depth models are being prepared. When completed, the pump will be manufactured and distributed in the conventional manner. Inventor of the pump is A. G. Bodine, Jr., president of Soundrive Pump Co., Los Angeles.

How it works . . . Source of the sound waves is a mechanical oscillator, mounted on top of the tubing head and shaft driven by either an internal-combustion engine or electric motor. Two meshing spur-gears with attached counterweights are the basic parts of the generator. The eccentric weights run in opposite directions and with such phase as to cause their centrifugal forces to cancel horizontally and add cooperatively in vertical oscillation.

The tubing string is supported by a small spring platform (see diagram) so that the upper end of the tubing is free to move vertically through about a 1-in. stroke. The tubing does not move as a whole, however; only parts of it oscillate up and down as it hangs from the spring platform.



SIMPLIFIED SKETCH of the sonic pump.

The periodic up-and-down force is applied to the top of the tubing at subsonic rates of about 10 cycles per second. The waves travel at the speed of sound in oil-well tubing or at the rate of approximately 16,000 ft. per second.

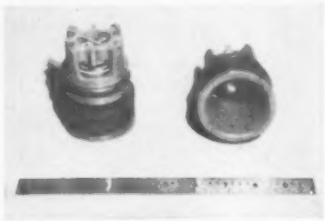
A conventional tubing string is made up with the one-way check valves installed between each joint. Tubing guides, consisting of a Micarta ring attached to a Neoprene spider, are used to assure the tubing will be free to move vertically.

As the waves travel down the tubing, vertical up and down oscillations are set up locally in the string—a motion somewhat akin to the pumping movement of the human intestine. There is little actual change in tubing length, but as the check valves oscillate with the tubing their movement is sufficient to lift fluids upward.

The valves open automatically on the down-stroke and close on the up-stroke. On the up-stroke the closed valve is an impeller; on the down-stroke the opened valve allows the impelled fluid to "coast through" until the next upward impulse.

Economics . . . Stresses and strains involved in the expansions and contractions of the tubing are similar to those occuring in conventional sucker-rod pumping. Each valve experiences light duty, because the pressure head is divided among many valves and in direct proportion to the distance the fluid must be lifted.

WAVE GENERATOR, mounted on the spring platform over the well, is shaft driven by the multicylinder engine shown in the background.



FLUID LIFTERS are these one-way check valves installed at each collar in the tubing string.

From the field experience thus far gained, it appears operating costs of the sonic pump will be as much as one-third or one-half lower than sucker-rod pumping. Because the tubing and valves are oscillating, and there are no sliding parts involved, high-sand-content fluids present no problem.

According to its inventor, installed cost of the sonic pump will be substantially less than that of a sucker-rod pump. Still other advantages claimed are the pump's ability to operate in crooked holes, its lower power consumption, the fewer workovers required, and that it will not "pound liquid when the well is pumped off."

Secondary-recovery aid? . . . A potential use of the pump is for increasing ultimate recovery from oil formations. Extensive laboratory tests and limited field tests have indicated oil recovery will be increased due to a portion of the sound wave being radiated into the oil-bearing formation from the bottom of the tubing. This use of sonics, as well as the pump itself, is covered by patent rights issued and pending.

The maximum depth at which the pump can be run is yet to be determined. It has been tested satisfactorily at settings below 5,000 ft.

SOUTHWEST

Gas a Target

Texas legislators already eyeing five proposed bills

AUSTIN. — Five bills affecting the natural-gas industry already have been introduced to the 1953 Texas Legislature, and the end is not yet in sight.

Three of the bills would levy additional taxes. Two more concern setting of minimum field prices. A sixth, not yet submitted, would tax dedication contracts.

A rundown on the proposed legislation shows:

. . . **A processing tax** of 1 cent per M.c.f. of natural gas proposed in a bill introduced by Rep. Charles E. Hughes to replace or supplement the gas-gathering tax now tied up in the courts *(The Oil and Gas Journal, January 5, page 30).*

. . . **A processing tax** on the manufacture of combustible condensates, either from crude or natural gas, of 1 cent per gallon suggested in a measure sent to the House by Rep. Grady Hogue, Martin Mills.

. . . **A horsepower tax** on engines driving natural-gas compressors of $60 annually per horsepower introduced by Rep. Dolph Briscoe, Uvalde.

. . . **Minimum field prices** proposed for natural gas produced in Panhandle-Hugoton field in a bill introduced by Sen. Grady Hazelwood, Amarillo. Bill would raise prices in the field to compare with those in the Oklahoma portion of Hugoton.

. . . **A waste-prevention measure** submitted by Sen. Wardlow Lane, Center, which would authorize the Texas Railroad Commission to set well-head prices of natural gas throughout the state.

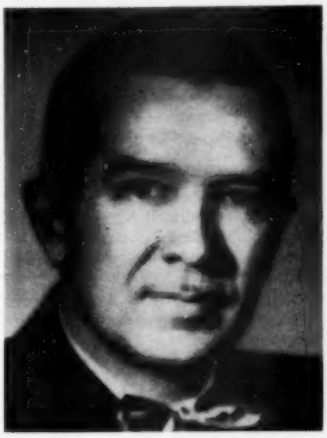
. . . **A tax bill** which would levy on dedication of gas under contract planned for submission to the legislature by Rep. George Hinson, Mineola. The bill would tax gas set aside for fulfilling contracts.

Spraberry Order Opposed

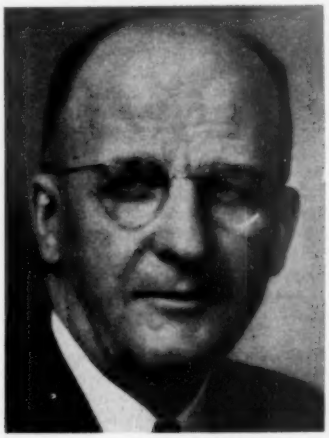
AUSTIN.—Opposition to the recent Spraberry trend spacing order issued by the Texas Railroad Commission has been registered by the executive committee of Texas Independent Producers and Royalty Owners Association.

The order, which established minimum spacing of 80 acres in the trend, was described by the executive group as "a grave threat to the welfare of independents and royalty owners."

The spacing order was approved by a 2-1 vote, with Commissioner Olin Culberson dissenting. Culberson contended the order exceeded the commission's conservation authority.



K. B. BARNES



C. O. WILLSON

Barnes Succeeds Willson as Journal Editor

KENNETH B. BARNES has been appointed editor of The Oil and Gas Journal to succeed C. O. Willson. Willson, whose resignation became effective February 1, will continue with the Journal as consulting editor.

Barnes joined the Journal organization in 1944 as engineering editor and was appointed managing editor in 1950. Before joining the Journal he was a technologist in the Tulsa executive offices of Gulf Oil Corp. for 10 years. He had served as professor of petroleum engineering at Penn State College for 5 years and the University of Tulsa 1 year before joining Gulf.

Barnes is a petroleum-engineering graduate of the University of Oklahoma and holds a master of science degree in chemical engineering from Penn State. He gained field and plant operational experience while employed by Marland Oil Co., Cities Service Oil Co., and Globe Oil & Refining Co.

Willson graduated from Ohio State University and served in World War I as a lieutenant. Upon discharge from the Army, he went to Texas and was employed in oil and newspaper work. He joined the editorial staff of The Oil and Gas Journal in 1922, completing 30 years of service with the publication last June. Willson was refinery editor of the Journal and, for a time, was in charge of the New York office of the publication.

He returned to Tulsa in 1936 when he was made editor of the Journal.

Willson is widely known not only in the United States but in oil circles of several foreign countries. In recent years, he made a tour of Middle East oil operations and the principal oil producing operations of South America. He also made a tour of naval oil operations in Alaska.

Investigation Put Off

Judge grants 90-day delay of grand jury proceedings in oil "cartel" case to permit new government to formulate policy

Bertram F. Linz

WASHINGTON.—The long-delayed grand jury investigation of an alleged international oil cartel was deferred for another 3 months by District Judge James R. Kirkland last week.

A 90-day extension of the deadline for the submission of documents subpoenaed by the Department of Justice was sought and obtained by the department January 27.

The delay was requested in order that new Atty.-Gen. Herbert E. Brownell might have an opportunity to confer with officials of other departments on questions of national security and other phases of the case. He also may want to review charges made by former Interior Secretary Oscar L. Chapman that the department is on untenable ground when it contends the alleged cartel has been responsible for a diminution of incentive to increase domestic production and has brought about the present shortage of aviation gasoline.

The charge was made by Chapman just prior to the change in administration, in a vigorously worded letter to retiring Atty.-Gen. James P. McGranery.

Strong defense . . . In a strong defense of the oil industry, Chapman charged that Leonard Emmerglick, special assistant to the attorney general, had persisted in his charge that inadequate reserve producing capacity resulted from the alleged cartel activities in the face of protests and an explanation of the situation by Deputy Petroleum Administrator J. Ed Warren.

While present reserve capacity is inadequate, the secretary declared, the deficiency is not due to any cartel activities but to a lack of steel. The incentive to drill wells still exists, he said, as demonstrated by the fact that operators unable to secure steel allocations have used second-hand pipe and resorted to purchase of high-cost conversion and foreign pipe.

The major companies involved in international trade have been as active as other operators in their efforts to drill, Chapman said, pointing out that one of them recently was charged with the purchase of black-market pipe in a case referred to the department by PAD.

Backfire possible . . . Chapman warned McGranery that Emmerglick's contention that one purpose of the cartel investigation is to free the Middle East from monopoly control so that production might be increased and prices reduced might backfire. There is no assurance, he said, that any change in the existing setup would not be followed by restriction of Middle East production. On the other hand, any increase in Middle East supply at reduced prices would break the world market price for oil and of itself be a serious deterrent to the incentive to drill more wells here, Chapman said.

So far as the shortage of aviation gasoline is concerned, Chapman said, Emmerglick based his charges on the fact that last May he was delayed in returning from Europe because of a lack of fuel. That situation, the secretary explained, was due to the refinery strikes then going on and was quickly remedied.

The domestic refining industry has done a fine job of meeting military requirements, Chapman asserted. It is naturally reluctant to invest tremendous sums for expansion of output in the face of definite indications that demand will diminish as the use of jet fuel increases, he pointed out, but incremental high-cost aviation gasoline can always be had if the military will pay the price, he said. During the last war the military paid $1.00 and more a gallon for aviation fuel. Currently its requirements are being met at an average price of 20 to 22 cents a gallon, and the highest price paid is no more than 38 cents.

Continuation opposed . . . In acceding to the Government's request for delay, to which oil-company attorneys naturally made no objection, Judge Kirkland again renewed his advice to the department to drop the criminal case and institute civil suits if it wanted to go on with the matter.

He pointed out that the Government has a choice of criminal or civil proceedings and inferred that the security aspects of the matter might make the latter desirable. In criminal proceedings, he said, everything must be done in court, but in civil cases depositions can be taken outside the court and much can be done by correspondence.

The present situation, Judge Kirkland emphasized, is "no victory" for either side, and it is up to the Attorney General and other executive officers to

Super Dragline Barge Ready for Operation

Cutting channels through southern Louisiana's marsh lands is the primary job of this monster, which will be used to make difficult drilling locations accessible. The barge was built for J. Ray McDermott & Co., Inc., by Avondale Marine Ways, Inc. It is equipped with a dragline unit powered by a 550-hp. diesel engine capable of handling an 8-yd. bucket under favorable conditions. The second of its type to be built by Avondale in the past 2 years, the barge, the "Ralph T. McDermott," may be equipped with "walking shoes" to enable it to move onto a bank under its own power if conditions require it.

decide whether the case is to be pursued further.

Emmerglick, who submitted the motion for postponement on behalf of the department, gave no hint of any future steps that might be taken.

The formal paper signed by Judge Kirkland said "the purpose of this motion is to preserve all rights of the United States of America while necessary study and conferences are being conducted as to the matters which present questions of national security. The additional time sought is necessary in order to do justice to the subject matter and interests of the United States of America."

Steel Distributed

309,372 tons of tubular goods sent to operators

WASHINGTON.—Second-quarter allocations of 309,372 tons of casing and tubing have been distributed to 1,695 oil and gas operators by the Petroleum Administration for Defense.

Supporting the contention of PAD officials that the lifting of controls on pipe might seriously disturb orderly industry operation, Deputy Petroleum Administrator J. Ed Warren pointed out that the pipe allocations are less than a third of what was requested by operators and almost 150,000 tons below what PAD calculated as their actual needs.

Applications aggregating 1,086,724 tons were filed with PAD by 2,017 operators. PAD denied 412 applications. The calculated needs of the operators whose requests were approved came to 451,514 tons.

Small operators file . . . Applications requesting 534,384 tons of pipe were filed by 1,952 Class A operators, who normally drill 40 or fewer wells a year. PAD denied 396 requests and allocated 115,033 tons to the remaining 1,556 applicants, whose actual needs were calculated by the agency at 164,554 tons.

Class B operators, who drill more than 40 wells a year, filed 142 applications for 549,081 tons. Fourteen applications were denied, and the 128 successful applicants were granted 192,215 tons, against calculated needs of 283,838 tons.

Eleven of 13 operators were granted allocations for brine, sulfur and service wells totaling 2,124 tons. The tonnage requested in the 13 applications was 3,259 tons and the calculated needs of the 11 successful applicants were figured at 3,122 tons.

Some set aside . . . In addition to the individual allocations, PAD set aside 22,200 tons of casing and tubing in emergency field stocks, chiefly for the drilling of wildcats by smaller operators.

Tidelands Hearing

Fourteenth since 1938 will be under way in 2 weeks

WASHINGTON.—The Senate Interior Affairs committee will open hearings on tidelands legislation within the next 2 weeks.

Committee Chairman Hugh Butler of Nebraska said the hearings will be wide open to "all who want to be heard" but that he will seek to bar any duplication of the testimony which the committee has taken in the 13 hearings it has held on the tidelands since 1938.

The Republican platform, President Eisenhower as a candidate, and Republican leaders in Congress have called for return of the tidelands to the states and it is expected the legislation sent to the Senate by the committee will call for that solution of the problem. But bills have been introduced in Congress calling for two other ways of settling the issue and it is expected that strong opposition to a quitclaim bill will be expressed. Particularly in view of former President Truman's designation of the tidelands as a naval petroleum reserve which raises anew the issue of national security.

In addition to the bills to restore the states' rights to their offshore oil reserves, proposed legislation calls for continuance of the nominal supervision by the Government formerly exercised by the Interior Department; establishment of a commission to study the whole submerged lands problem, and the setting aside of Truman's executive order.

If President Eisenhower does not act to set aside his predecessor's order, it will of course be nullified in any legislation Congress enacts to divest the Government of its alleged rights in the tidelands.

Container Conspiracy Alleged

WASHINGTON.—An alleged price-rigging conspiracy in the sale of steel drums is under attack from the Federal Trade Commission.

The commission last week issued a formal complaint charging five major steel companies and three subsidiaries with establishing "standards" in the production of steel drums in order to control prices. The companies involved are alleged to control at least 75 per cent of the domestic steel-drum business.

Named in the complaint were United States Steel Corp. and its subsidiary, United States Steel Co.; Jones & Laughlin Steel Corp. and its subsidiary, Jones & Laughlin Steel Barrel Co.; Inland Steel Co. and its subsidiary, Inland Steel Container Co.; Rheem Manufacturing Co.; and Republic Steel Corp.

The respondents are charged with agreeing to maintain uniform standards for pricing purposes, fixing uniform base prices, and maintaining uniform price differentials, terms and conditions of sale, among other practices, in alleged violation of Section 5 of the Federal Trade Commission Act.

Pipe Violations

Four alleged black market cases go to Justice Dept.

WASHINGTON.—Four new cases of alleged black-market operations in casing and tubing have been referred to the Department of Justice by the Petroleum Administration for Defense.

At the same time, PAD disclosed, the cases have been reported to the National Production Authority for possible action to deprive the alleged black marketeers, if found guilty, of future allocations of pipe.

The first criminal prosecution arising out of violation of the Defense Production Act controls in the oil industry was announced in November by the Department of Justice. That case involved The Texas Co., Superior Iron Works & Supply Co., and eight individuals indicted by a federal grand jury at Shreveport, La., for alleged illegal diversion of oil-country tubular goods.

Smaller firms . . . The new cases involve 15 persons and three firms, reportedly none of them a major company, charged with sales of casing and tubing at black-market prices without the proper authorizations from PAD. The individuals and firms are variously located in New York, Pennsylvania, West Virginia, Michigan, Ohio, New Mexico, and the District of Columbia, and some of the pipe involved allegedly was sold to Canadian operators. One of the cases, PAD said, involves a reported sale of photostatic records of two PAD authorizations for the purchase of pipe, which were used illegally in order to get pipe for a later sale.

"Oil-country tubular goods are still in critically short supply," Deputy Petroleum Administrator J. Ed Warren said in announcing PAD's action. "In fact the lack of such goods has been a large factor in limiting the drilling of new wells and consequently in

building the reserve of productive capacity we would need in the event of war.

"Under the circumstances it is imperative that the orders which insure an equitable distribution of the available pipe be followed closely. We intend to see to it, then, as far as we can, that any violations of the orders will be vigorously prosecuted. Our investigations of other reported possible violations are continuing and will be pushed relentlessly."

Products Exports Off Sharply

WASHINGTON.—Exports of major oil products dropped sharply over the year end, averaging only 152,400 bbl. daily during the week ended January 2 as against 247,600 bbl. daily during the preceding week, according to figures compiled by the Petroleum Administration for Defense.

Shipments of residual fuel showed a slight increase, but the exports of the other four products fell off heavily.

Details of the week's movement, compared with the preceding week, and averages for the 4 weeks ended January 2 are shown in the accompanying table, in thousands of barrels.

	Week ended— Jan. 2	Dec. 26	Average 4 weeks
Aviation gasoline	27.6	47.2	34.1
Motor gasoline	54.3	75.0	62.2
Kerosine	0.0	29.8	12.6
Distillate	39.5	65.7	73.6
Residual	31.0	29.9	38.0
Total	152.4	247.6	220.5

NPC to Meet February 26

WASHINGTON.—The first meeting of the National Petroleum Council under the administration of Secretary of the Interior Douglas McKay has been called by NPC Chairman Walter S. Hallanan for February 26.

Hallanan, who set the date after conference with McKay, said that in addition to matters of organization it was planned to receive reports from committees now studying the cost of producing synthetic liquid fuels, productive capacity of the submerged lands, and the industry's use of radio and radar.

A new investigation of the productive capacity of the United States as of January 1 was launched last week by Hallanan with appointment of a committee to make the survey, requested by the Oil and Gas Division. The committee will be headed by L. F. McCollum, president of Continental Oil Co., Houston, who headed the committee which made a similar study last year.

WATCHING WASHINGTON

Bertram F. Linz

More Investigations

Plans for investigations are beginning to pile up at the Capitol.

In addition to the study of national fuel policy proposed by Chairman Butler of the Senate Interior Affairs Committee and the survey of the nature and habits of regulatory bodies which Chairman Wolverton of the House Interstate Commerce Committee has said he will make, several more general investigations are in the making.

Butler has asked the Senate for a fifth extension of time, until next January 31, and a fund of $10,000 to complete his study.

Within the next couple of weeks or so House and Senate committees plan to take up price, wage, and materials controls, in connection with extension of the Defense Production Act.

The question of Federal Power Commission jurisdiction over the production and gathering of natural gas may be revived if the courts throw out the commission's finding that it is without authority in the Phillips Petroleum Co. case.

A comprehensive study of the antitrust laws and their administration by the Department of Justice and Federal Trade Commission has been proposed with a view to revamping the whole antitrust code, if necessary, to eliminate the conflicts which now exist among the several statutes such as the Sherman, Clayton, Federal Trade, and Robinson-Patman Acts and rectify "misapplications and misinterpretations" that have developed.

House and Senate committees plan to resume their investigations into the situation of "small business," and a number of Senators are behind a move to establish a similar forum for consumers, whose interests, they say, have been sadly neglected by Congress.

Reciprocal Trade Act

Just how much the reciprocal trade agreements have contributed toward closing the dollar gap of other countires and what it has done to domestic industry may be thoroughly explored this spring when continuance of the Reciprocal Trade Act comes up for congressional consideration.

Domestic oil producers, as well as many other industries, have consistently denounced the agreements as detrimental to our own economy.

The Republicans have announced they will seek to put our foreign program on a "trade, not aid" basis. Domestic producers and manufacturers say our tariff rates are too low, and open the gates to a flood of imports. Foreign producers assert the rates are too high and they cannot export to us.

Under the trade program duties can be reduced to 25 per cent of what they were prior to 1934, and have been in the case of fuel oil and many other commodities. Actually the cut, over-all, has been much greater because "specific" duties, in cents per unit, drop in ad valorem ratio as prices increase.

Under the Hawley-Smoot tariff of 1931 the average tariff on dutiable goods was 53.2 per cent and the tariff on all imports, dutiable and free, worked out at 17.8 per cent. Over the past 18 years the rates have been cut to 12.5 per cent average on dutiable imports and 5.6 per cent on all imports.

If Europe couldn't close her dollar gap at these low rates it would seem that something more than tariffs alone is involved.

Justice Study Asked

Reorganization of the Department of Justice to improve its administration and a study to more clearly define the limits of jurisdiction of the department and the Federal Trade Commission are recommended in a study which has been laid before the Eisenhower administration.

Initiated last October by former Attorney General James P. McGranery, the study is critical of what it called the effort of the antitrust division to steer a middle ground between criticism from, first, those who contend that the capitalistic system can best be served by the breaking up of monopolistic aggregations and the application of strict limitations on the restraint of trade and, second, from those who contend the division has attempted to use the antitrust laws as a device for "persecuting" business.

The survey was made by an outside group of management consultants, who also were critical of the overlapping of functions and duplication of work.

Wildcat Extends Trend

Discovery in Weld County, Colorado, indicates possible production in central portions of Denver-Julesburg basin

John C. McCaslin

DENVER. — A recent discovery 35 miles northeast of Denver in southeastern Weld County, Colorado, may prove a most significant development for the Denver-Julesburg basin—the most active region in the Rocky Mountains last year.

Twin Oil Co. 2 Cuykendall *(star on map)* has been shutin for storage after flowing oil at the rate of 3 bbl. per hour from the "J" sand at 7,018-32 ft. on a 1-hour test.

Southeastern Weld County, which approaches the deepest portion of the basin, has not attracted a great deal of attention. The new discovery is the southwesternmost extension of the producing trend in northeastern Colorado, indicating possible commercial production further toward the central and deeper portions of the basin. The strike is in the projection of the possible producing "trend" extending northeastward into the Goodwin area of eastern Kimball County, Nebraska *(B on map)*.

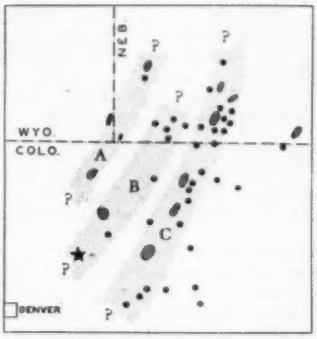
Possible trends . . . The producing areas of the eastern portion of the Denver-Julesburg basin have taken on the appearance of three possible trends, which are indicated on the map. These apparent trends roughly parallel the southeastern limits of the basin (Las Animas arch).

The westernmost of these trends extends from Keota pool in Weld County to Harrisburg pool in Banner County, Nebraska. Van Pelt pool in Banner County was added to this trend last year. One small pool in Laramie County, Wyoming, also might be considered in this trend.

The second trend (B) extends from the newest discovery in the basin to the Goodwin area of Nebraska. Eight new discoveries were added to this trend in 1952.

The third trend (C) extends from Byers pool in Adams County, Colorado, directly east of Denver, to Morrill County, Nebraska. Most of the basin's pools and new discoveries lie within the projection of this possible trend.

Description . . . The Denver-Julesburg basin, as defined by contours on top of the Dakota, is asymmetrical with a gentle dipping east flank, an axis running close to the Rocky Mountain



front, and a steeply dipping west flank. The so-called producing trends cut across these structural contours.

The largest trend (C), running from Byers pool through Lee pool northeastward into Morrill County, Nebraska, climbs from about —1,000 ft. at the south end to about —250 ft. at the north end. The second trend (B) starts at about —2,200 ft. at the most recent discovery in Weld County to —900 ft. at the north end in Kimball County. The westernmost trend (A), located just east of the Cheyenne low in Wyoming, runs from —2,000 ft. to about —1,600 ft. between Keota and Sissen pools in southwestern Kimball County.

All production from the basin's 43 fields is from Cretaceous sands of the Dakota-Lakota series. The third Dakota, or "J" sand, is the leading producing formation.

During 1952 considerable wildcatting was done along the Las Animas arch in the southeastern rim of the basin in search of production from the deeper horizons of the basin. One small gas well was completed in Kiowa County, Colorado, by Continental Oil Co. in the Morrow (Pennsylvanian). Additional drilling in this area and further southeast in Colorado in the extreme northwestern section of the Anadarko basin is expected this year.

1952 record . . . Operators recorded 35 new discoveries in the Denver-Julesburg basin last year. Colorado accounted for 20 of these, 14 oil and 6 gas pools, while Nebraska reported 15 new pools, 12 oil and 3 gas. Production was moved into Washington County, southeast of previous pools, and also westward into Adams and Weld counties. In Nebraska production was moved northward into previously nonproductive Morrill County by the opening of Hart field. This new field marked the most northerly extension of production in the basin. In extreme northeastern Colorado Chappel pool was opened in Sedgwick County, the first production for that county.

1953 prospects . . . A big year is expected in the basin in 1953. The new Platte Pipe Line has increased outlet facilities, encouraging increased development and exploration in the basin as well as areas in Wyoming. Last year was a big year for the basin's independent operators who made a large number of the area's discoveries. In the past 3 years an influx of small operators has been noted in the basin. This is reportedly due to the comparatively low cost of drilling and the shallow producing depths.

GULF COAST

Louisiana Allowable Raised

BATON ROUGE. — February production allowables for crude oil in Louisiana have been increased 5,354 bbl. daily by the conservation department, to 698,817 bbl. daily.

This is the sixth month consecutively that production allowables have been increased.

The southern part of the state was given a permissible production of 578,991 bbl. daily compared with 119,826 bbl. daily for northern fields.

Production of liquid hydrocarbons, other than crude oil, was estimated at 68,350 bbl. per day. It was figured that actual crude-oil production for the month of February would amount to 657,817 bbl. daily.

Drilling-Unit Law Tested

JACKSON, Miss. — Land owners within a legal drilling unit must share alike in royalties from gas or oil, even though their properties may not be equally productive, the Mississippi Supreme Court has ruled.

The ruling was on a case in which Humble Oil & Refining Co. had sued to separate its holdings from those of A. E. Welborn and others. Humble had won its case in a Jones County court, which held the law involved to be unconstitutional, but this ruling was reversed by the Supreme Court action.

Octane Ratings Rising

Latest Du Pont survey shows 50-city average for premium motor fuel is 90.8, for regular 84.3; trend is upward

THE trend of motor-gasoline octane ratings is still upward, according to the quarterly survey made by the petroleum-chemicals division of E. I. du Pont de Nemours & Co., Inc.

The unweighted 50-city average of premium gasoline stood at 90.8 on the first of this year, an increase of 0.3 of a number during the last quarter of 1952 and a gain of 0.9 during the entire year.

The average of the octane numbers for regular gasoline in the cities shown in the accompanying table stood at 84.3 early in January, an increase of 0.4 of a number since October 1 and 1.1 numbers within the past year.

Less TEL . . . The use of tetraethyl lead reversed its upward trend, both in regular and premium gasoline, averaging 1.78 cc. per gallon for regular and 2.10 cc. per gallon for premium in the latest Du Pont survey. The previous survey, covering the third quarter of 1952, showed an average use of 1.96 cc. per gallon for regular and 2.26 cc. per gallon for premium.

The January survey covered tests on 711 fuels, including 353 premium and 358 regular, 44 cities in the United States and 6 in Canada.

All samples were picked up between December 29, 1952, and January 2, 1953. Tests were made by the five district laboratories of the Du Pont petroleum-chemicals division.

Samples for this and the previous surveys were taken from the same service stations where possible, the report said.

Fourteen cities, most of them on the East Coast, reported an average premium-grade octane rating above 92 during the last survey. These included Atlanta, Boston, Baltimore, Charlotte, Cincinnati, Cleveland, Dallas, Fort Worth, Detroit, Houston, Jacksonville, New York City, Philadelphia, and Pittsburgh.

COMPARISON OF MOTOR-GASOLINE SURVEYS
(Octane numbers are by research method; arithmetic averages by cities)

	Premium				Regular			
	Octane number			TEL cont.	Octane number			TEL cont.
	Jan. 1952	Oct. 1952	Jan. 1953	cc./gal. Jan. 1953	Jan. 1952	Oct. 1952	Jan. 1953	cc./gal. Jan. 1953
Aberdeen	88.5	88.9	90.0	2.17	81.8	82.7	83.3	1.66
Amarillo	88.0	88.3	89.4	2.14	80.4	80.9	81.5	2.27
Atlanta	91.3	92.3	92.5	1.98	84.7	85.2	85.3	2.12
Bakersfield	89.6	89.1	89.2	2.59	80.4	81.2	80.6	1.56
Baltimore	92.6	92.3	92.4	1.98	86.3	87.2	86.8	2.03
Boston	92.2	92.7	92.7	2.20	86.9	87.5	87.6	1.88
Calgary	85.9	87.4	86.6	2.47	79.3	81.4	81.3	2.28
Casper	89.0	89.7	89.0	1.34	81.0	82.2	82.2	1.09
Charlotte	91.5	92.3	92.5	2.11	85.3	85.3	85.3	1.91
Chicago	89.3	90.3	90.4	1.95	82.0	83.2	83.8	1.76
Cincinnati	91.1	91.4	92.2	2.53	86.0	86.1	86.6	1.94
Cleveland	91.0	91.7	92.8	2.52	86.4	87.0	87.4	1.58
Columbus	91.5	91.9	92.0	2.16	86.4	87.1	87.6	1.81
Corpus Christi	90.6	91.3	91.9	2.28	83.2	83.8	84.6	2.32
Dallas-Fort Worth	91.6	91.8	92.4	2.09	83.9	84.4	84.5	2.30
Denver	88.3	89.1	89.7	1.54	81.0	80.7	81.1	1.47
Detroit	90.7	91.8	92.3	2.08	85.6	86.8	87.0	1.59
Edmonton		88.1	87.1	1.72		82.8	82.5	1.15
El Paso	85.6	86.0	90.6	2.74	77.7	76.7	81.3	2.00
Great Falls-Billings	90.0	90.0	90.7	1.76	82.0	82.6	83.0	1.31
Houston	91.6	92.0	92.1	2.25	84.4	84.9	85.2	2.24
Indianapolis	89.5	90.2	90.0	2.12	83.3	83.8	84.0	1.95
Jacksonville	91.4	92.2	92.3	2.06	85.4	86.0	85.8	2.07
Kansas City	89.0	90.1	90.1	1.98	82.3	83.0	83.3	1.91
Little Rock	90.4	91.4	91.7	1.95	83.4	84.1	85.4	1.55
Los Angeles	90.1	90.6	90.8	2.08	82.0	82.3	82.8	1.67
Louisville	90.4	91.3	91.8	2.49	84.1	85.2	86.1	2.31
Memphis	90.9	91.5	91.6	2.46	83.9	85.1	85.4	1.92
Milwaukee	89.6	90.7	91.4	2.12	82.9	83.6	83.9	1.58
Minneapolis	88.6	89.5	89.9	2.31	82.3	82.6	83.4	1.79
Montreal	89.9	90.4	90.3	1.21	84.7	85.5	86.3	0.79
Nashville	90.7	91.6	91.8	2.23	83.8	85.2	85.2	2.13
New Orleans	90.2	91.7	91.6	2.30	83.8	84.8	85.7	1.85
New York (met. area)	92.2	92.6	92.2	2.20	86.4	87.0	87.0	1.97
Omaha	88.7	89.5	89.6	2.18	81.8	83.0	82.7	1.40
Philadelphia	91.8	92.3	92.3	2.08	86.5	87.1	87.1	2.19
Pittsburgh	92.0	92.5	92.1	1.93	86.2	86.8	87.3	2.14
St. Louis	89.0	90.2	90.1	1.93	82.4	82.7	83.9	1.74
Salt Lake City	88.9	88.3	87.9	1.05	79.7	80.1	79.7	0.43
San Francisco	90.4	91.1	91.4	1.99	81.8	82.0	82.4	1.50
Seattle	90.1	90.9	90.7	2.41	80.7	82.3	82.0	1.83
Shreveport	90.3	91.0	91.6	2.64	83.8	84.9	84.9	2.34
Spokane	89.2	89.9	90.1	1.82	81.6	81.9	82.9	1.46
Toronto	90.1	90.4	90.3	1.85	85.4	85.9	86.4	1.86
Tulsa	89.2	89.8	90.2	2.05	82.3	82.6	83.1	1.60
Vancouver	88.7	88.9	89.0	2.82	83.6	83.6	82.7	2.09
Wichita	87.2	88.0	89.1	2.58	80.8	81.8	82.7	1.92
Winnipeg	87.1	88.8	88.8	1.41	82.8	84.7	84.7	1.14

GENERAL COMPARISONS*

	Jan. 1952	Oct. 1952	Jan. 1953
Premium:			
Research Oct. No.	89.9	90.5	90.8
TEL content (cc. per gallon)	1.75	2.26	2.10
Regular:			
Research Oct. No.	83.2	83.9	84.3
TEL content (cc. per gallon)	1.36	1.96	1.78

*Unweighted averages of cities shown in table.

Four Tankers Ordered

NEW YORK. — Four tankers were reported contracted, two launched, and one delivered in the United States since December 1, according to the latest report of the Shipbuilders Council of America.

The four vessels contracted are each of 38,000 tons deadweight and will be built by Newport News Shipbuilding for Grand Bassa Tankers, Inc. One 29,000-ton tanker was launched by Bethlehem for Santander Cia. Naviera, S. A., and another of 18,075 tons, for The Texas Co. by Newport News Shipbuilding. Bethlehem delivered a 29,000-ton tanker owned by Brilliant Transportation Co., S.A.

The council report showed 55 tankers under construction or on order in the United States at the beginning of the year, with a total deadweight tonnage of 1,456,250.

Maintenance Trend

Centralized craft control giving way to greater adoption of zone system in refineries, maintenance group reveals

George Weber

CLEVELAND.—Refinery maintenance is receiving added attention from management and many new ideas are being put to trial in all phases of plant upkeep.

This was brought out in discussions during the fourth plant-maintenance conference held here in conjunction with the annual plant-maintenance show sponsored by the American Society of Mechanical Engineers and the Society for the Advancement of Management.

While the discussions showed a few pronounced trends, they also revealed wide differences in many maintenance procedures and policies.

For instance, in the organization of maintenance departments, the group reflected a fairly strong trend away from the centralized craft control toward greater adoption of the zone system. While the craft system is being retained in some of the plants represented, more are shifting added responsibility to area or district foremen in the field.

These facts were revealed in a round-table discussion on maintenance in petroleum refineries conducted on two consecutive days under chairmanship of J. G. Trexler of Humble Oil & Refining Co., Baytown, Tex. About 40 men representing more than 20 refineries took part in the discussions. Also discussed were procedures for initiation and authorization of work, planning and scheduling maintenance work, unit-turnaround practices, routine maintenance, current design practices and maintenance techniques, and personnel practices.

Complete area coverage . . . One refinery in the 50,000-75,000-bbl. per day class has gone over completely to area coverage, the group learned. With exception of instrument and electrical workers, all maintenance crafts are regularly assigned by a line-planning committee to eight area supervisors who hold complete control.

Each area comprises one process unit on the average, and the area maintenance supervisors work with their respective process supervisors. The entire refinery is divided into three districts embracing process, shop, and packaging and shipping facilities, respectively, with three district foremen working under a general maintenance foreman. Craft foremen have some supervision in the shops and are consulted in the process areas when necessary.

Compromise system . . . A second refinery, having tried the above plan, found it more effective to modify it with a compromise system. Area supervisors retained control over jobs in their respective geographical sections, but the dispatching, discipline, and supervision on craft "know how" was returned to craft foremen. When crews are sent into the field they are accompanied by a craft foreman or lead man, depending on their size.

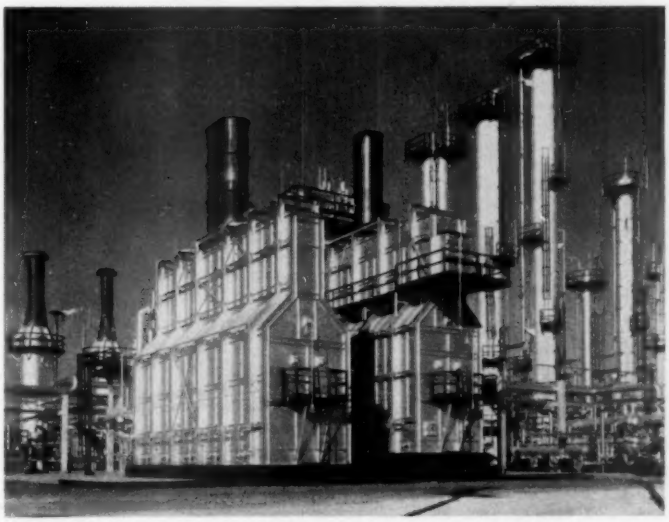
Other plants were reported to be planning or carrying out decentralization of maintenance supervision. In some large refineries, the maintenance payroll has reached a size which makes central supervision unwieldy and a central planning group breaks down the force into areal groups. Craft foremen work under area supervisors, and remain in charge of training.

The group discussion indicated that in general maintenance work direct supervision is being decentralized and planning and scheduling is being better integrated through the use of committees and groups representing all pertinent departments of the refinery.

Work orders . . . In discussing the procedures for initiation and authorization of work, the round-table members again showed a wide range of policy.

Some held that every job, no matter how small, should be backed up by a work order for the proper instruction of the worker, the information of the process supervisor concerned, and the correct designation of responsibility for its initiation and approval. However, it was revealed that some plants where the work-over system is followed completely also assign permanent field crews to some process areas, whose small or routine jobs are either covered by annual work orders or verbal orders by supervisors. Some maintenance men felt the need for a more-stringent work-order system to curb the growing volume of maintenance work which they felt should be done in part by operating personnel.

Turnarounds . . . Much interest was shown in the methods for conducting major unit turnarounds. Prior meetings by planning groups are an accepted



BTX Means Money for Cosden

The letters stand for benzene, toluene, and xylene made by these new Platformer-Udex units at Cosden Petroleum Corp.'s 30,000-bbl. refinery at Big Spring, Tex. In addition to dehydrogenating low-boiling naphthas into aromatics and octane upgrading of the heavy naphtha, the BTX units produce petrochemicals which Cosden estimates will bring a gross operating profit of $5,000 per day. Cosden has a 5-year contract for half of its benzene and xylene and has set up an organization to sell the rest on the open market. For more on this plant see page 81.

procedure, although the degree of preplanning varies between refineries. Some hold postturnaround meetings immediately after the unit has gone back on operation, with periodic meetings continuing until the intensive planning begins 1 month before the next turnaround.

The problem of handling last-minute requests and changes from operators and management received much attention. In one refinery the plans are "buttoned up" well before the unit comes down, and any subsequent changes are made only with the express understanding as to how much such requests will extend the downtime. This plan has effectively reduced the number of last-minute requests most of which should have been made previously.

Various bottlenecks were reported as the limiting factors in shutdown time: Exchanger cleaning, tower cleaning and inspection, reactor inspection and repair, and waste-heat boiler retubing. These jobs on which crew size is often restricted are given prior attention in planning turnarounds.

Some refiners represented at the forum place such jobs on three shifts during the early part of the shutdown, and one continued exchanger cleaning through three shifts 6 days a week throughout the period.

In one major refinery all work on fluid cat cracker turnaround is begun with three shifts through the first 36 hours and with the exception of botleneck jobs is then slacked off to one 9-hour shift on a 6-day basis for the remainder of the 4-week shutdown.

Preturnaround work . . . More preturnaround work is being done to relieve the peak manpower load and shorten the downtime. Some refiners are changing pumps, substituting exchanger bundles, installing scaffolding and stripping insulation on a unit before it comes down. Since most turnarounds are scheduled for winter periods when cat crackers can best be taken off stream, operation at reduced capacity prior to the shutdown will permit much of this work to be done beforehand.

Removing coke . . . Coke removal from furnace tubes and cracking coils by controlled burning was found to be almost universally followed by the group. Some assign unit operators to the job and some insist on using engineers. All agreed that personnel should have thorough training in the technique. Some refiners restrict this coke-burning method to radiant sections where the tubes can be viewed at all times, and do not attempt it in convection sections of furnaces.

A maximum tube temperature of 1,175° F. was the agreed limit in burning. Those trying the technique for the first time were warned to become well acquainted with the method to avoid damage from overheating tubes. Most reported they experienced some roll leaks after using it for the first time, but found that this trouble lessened or disappeared on subsequent shutdowns.

Since an estimated 50 per cent of the coke is believed to be loosened and blown out ahead of the burning zone as it traverses the tubes, maintenance supervisors were advised to open the two outlet rows for inspection for erosion before returning the unit to operation.

Organizing maintenance . . . Problems persist in striking a proper balance among crafts in most refineries. Other problems concern the ability to meet peak manpower loads during turnarounds and the finding of profitable work for permanent crews during slack periods. One large refinery uses construction work as a "cushion," maintaining about a 3-month backlog of such work. Others size their forces so that a backlog of routine maintenance work is held on the books at all times to prevent layoffs.

Outside contracting is practiced by some to meet peak-load requirements and by others to handle routine work such as painting.

Some refiners are decentralizing stores to the extent of establishing temporary outlets for small items in busy areas and at unit turnarounds. Control is maintained by the central storehouse. This policy has speeded delivery of most-needed items in the field.

Cleaning tube bundles . . . Considerable interest was evinced in hydraulic tube bundle cleaning methods with and without sand.

They were held generally satisfactory by those using them, except for the removal of sticky polymer coke. This requires chemical soaking and cleaning before blasting. Some bundles are being cleaned by the burning method but little information was given on that method.

Wherever feasible, chemical cleaning of towers both in operation and during shutdowns, was recommended. Corrosion of bright metal after water cleaning of tube bundles can be halted successfully before reinstallation by adding inhibitor to the water, according to one refiner. This is not considered sufficient to protect tubes for storage, and one refiner is experimenting on the use of a low-melting-point wax for the latter purpose.

Mobile material-handling equipment appears still to be gaining in popularity. Higher-powered fork-lift trucks with movable arms seemed to be favored. Installation of trolleys and davits for handling tube bundles and other equipment was generally recommended and wherever ground space is available, maintenance men favor the spacing of equipment so that it is accessible to mobile handling units.

Industry Briefs

EDMONTON, Alta. — Dominion Minerals Development, Inc., has been formed as a wholly owned subsidiary of Dominion Minerals Development, Ltd., to operate in the United States. The new company will participate in land acquisitions and drilling programs.

SAN FRANCISCO.—Bishop Oil Co. has completed organization of a subsidiary, Canadian Bishop Oil, Ltd., which will begin soon a program of land acquisition in Alberta, Saskatchewan, and British Columbia. Donald I. Lawless is exploration manager of the new Canadian firm.

CHICAGO. — Union Pacific Railroad has announced it will experiment with the use of propane in its new gas-turbine locomotives. The company now has six turbine engines in operation and 19 more on order. Normal fuel for the turbines is No. 6 or Bunker C.

ABILENE, Tex.—A new company, Texas-New Mexico Development Corp., has opened offices here. The company will operate in West Central Texas, West Texas, and southeastern New Mexico. Officers include L. G. Rhodes, Abilene drilling contractor and producer, president; C. S. Noland, former district geologist with Skelly Oil Co., executive vice president and chief geologist; H. L. Corley, Dallas, treasurer; and R. G. Pettengill, New York, secretary.

HOUSTON. — N. Henry Gellert, president of Seattle Gas Co., Seattle, Wash., announced here last week he will support before the Federal Power Commission the application of Pacific Northwest Pipe Line Corp. for a permit to build its proposed 1,400-mile, 26-in. gas line from the San Juan basin to the Pacific Northwest. Seattle Gas

is one of the largest utilities in the Pacific Northwest. Gellert said his party will appear before the FPC February 16.

TULSA.—Kewanee Oil Co. has announced it will build a new office building here, with construction to begin in about 90 days. The building will be at the intersection of Boulder and Fourteenth, in an area where the American Association of Petroleum Geologists is now building a new headquarters and where both Skelly Oil Co. and the Independent Petroleum Association of America are planning new buildings.

OKLAHOMA CITY. — Oklahoma's February allowable last week was set at 539,905 bbl. daily, unchanged from January and December. Nominations totaled 523,069 bbl. daily.

New Fire Hazard?

Cathodic protection in refineries may become a hazard for fires started by lightning, A.I.E.E. group told

NEW YORK.—Refinery fires caused by lightning, static, and stray currents have been reduced to small annual losses, but refiners should keep an eye on cathodic-protection insulation, members of the American Institute of Electrical Engineers were told at the institute's annual winter meeting here January 19-23.

George F. Prussing, consulting engineer, Washington, D. C., drew attention to a possible growing hazard from lightning resulting from the increased attention being given to cathodic protection in refineries. To prevent corrosion many refiners have installed insulating flanges in pipe systems.

There is a possibility that lightning surges along such lines may cause sparking and resultant threat of fire. While the author knew of instances when such insulating flanges have been perforated in this way, so far as he has been able to learn, no fires have directly resulted to date.

Where lightning protection has been installed for wooden-roof tanks and concrete reservoirs, it has given practically 100 per cent service. Because of the steady elimination of such storage for low-flash materials, and the industry's attention to those remaining in service, the principal remaining threats from lightning concern the occasional ignition of all-steel, supposedly vapor-tight tanks, and an occasional ignition of a floating-roof tank at the annular seal between the deck and shell.

Plenty of strokes . . . With the increased installation of tall steel structures for catalytic cracking units, refineries in the past few years have probably taken more lightning strokes than ever before in their history. However, damage has been practically nil to structures and they in turn have undoubtedly shielded scores of smaller units about them.

Static fires are now well under control, Prussing said, and fires from stray currents are even more rare. But cathodic protection in a plant may upset dependence on pipe grids as lightning dissipators, and must be taken into account.

Takes issue with N.E.C. . . . Prussing took issue with unrealistic interpretation and administration of the National Electric Code in specifying explosionproof equipment in various parts of a refinery, where open fires are necessary. The industry resents having to buy explosionproof electrical equipment for service in such areas.

He cited the part which the Western Oil and Gas Association played in the adoption of a California code which takes such circumstances into consideration.

"We now don't have to put explosionproof lights and switches in laboratories where Bunsen burners and other open flames are constantly present," he said. Before the California code was adopted he noted that one refiner spent $100,000 unnecessarily on explosionproof equipment in and about an area where gas and oil-fired furnaces were located. "We won't have to do that again."

Outdoor switchgear . . . At a special session on petroleum matters, E. R. Hoyle, of Sinclair Refining Co., East Chicago, Ind., discussed his company's experience with outdoor switchgear in refineries. Sinclair has such equipment installed in four refineries located in the north, east, and Gulf Coast. Installation costs have been reduced, and maintenance has proved no serious problem.

The major point on maintenance is to apply a good permanent protective coating to such equipment. This has proved sufficient in areas which experience hard winters and in coastal locations where proximity to salt water and chemical plants represent a threat of atmospheric corrosion. Based on the favorable service the company has had

It Gets Cold in Canada . . .

. . . And when your truck stays outside overnight with the engine idle, it takes something like this to get it started the next morning. This photograph was made as Socony-Vacuum Oil Co., Inc., workers prepared a winter base for seismic operations in western Canada. The winter season, in spite of temperatures often below —40°, is considered excellent for exploration work, since marsh lands, rivers, and lakes are frozen over and transportation is simplified.

from such exposed equipment, further outdoor installations of switchgear is planned.

Electric power . . . The peculiar problems of generation and distribution of electric power in refineries were discussed by R. F. Lawrence and H. B. Thacker of Westinghouse Electric Corp., East Pittsburgh, Pa. They outlined optimum designs for bussing arrangements for various plant loads, and discussed reliability, voltage class, ties to electrical utility systems, and circuit-breaker applications in power systems of various types.

L. M. Goldsmith of Atlantic Refining Co. reported on the activities of the electrical equipment subcommittee of the American Petroleum Institute, of which he is chairman.

Biggest Tanker in Operation

NEW YORK.—The 38,000-ton Petro Kure, newly completed in a shipyard in Japan as the world's largest tanker, has been chartered for 10 years by Sinclair Refining Co. to become the flagship of the Sinclair fleet.

The vessel was built by National Bulk Carriers at its yard at Kure City, Japan. It was delivered January 1 and left to pick up a cargo of crude in the Persian Gulf for Sinclair's Marcus Hook, Pa., refinery. Sinclair will use the ship on the company's regular run between Amuay Bay, Venezuela, and Marcus Hook.

The ship carries some 278,000 bbl. and is the first of four similar giant tankers to be constructed by National Bulk Carriers in Japan. Until the Petro Kure went into service, the rank of the world's largest tanker was held by the World Concord of about 33,000 tons deadweight.

Oil Show to Be Biggest Yet

TULSA.—Supply and service companies participating in the International Petroleum Exposition this year will spend more than $10,000,000 in showing their exhibits, William B. Way, general manager of the exposition, predicted here last week.

Way said this year's exposition, scheduled for May 14-23, will be the largest ever held and "could be the largest industrial show in the world."

All of the I.P.E.'s 883 regular booths have been taken, he said, and practically all of the 10 acres of space added to the grounds this year has been assigned. The new space includes an addition on the west end of the exposition grounds and the inclusion of a strip of land paralleling the north edge.

MID-CONTINENT

Bigger Allowable

Kansas offers incentive for wells below 4,500 ft.

WICHITA, Kans. — In an incentive measure to induce oil operators to conduct deep oil development in western Kansas areas, the Kansas Corporation Commission last week issued an order granting higher allowables to wells producing below 4,500 ft. The order is effective as of 7 a.m., February 1.

T. A. Morgan, conservation director, explained that the action stemmed from evidence presented before the commission at the November 1952 statewide hearing and from informal suggestions received from oil operators that deeper drilling was needed in Kansas. *(The Oil and Gas Journal, June 2, 1952, page 59).*

Graduated scale . . . The incentive lies in a graduated depth-allowable allocation arranged in increments of 500 ft. starting with 4,500-ft. wells which modifies the basic allowable through application of a "proportional factor." The normal per well allowable will be calculated as in the past, and allocations for each range of depth shall then be determined by multiplying the allocation by the proportional factor for each depth range as set out in the following schedule released by the commission, Morgan said.

For example a 4,750-ft. minimum well with a normal allowable of 25 bbl. would receive a modified allowable of 37 bbl. per day based on the application of the proportional factor (in this case 1.48) for the depth bracket for that well. The calculation is based on simple arithmetic. However, the basic allowable is subject to change from month to month depending upon the market demand for Kansas crude.

The order sets forth that the producing depth of the first well in the field determines the depth range of all wells in the pool producing from the same formation.

Will encourage development . . . Kansas oil producers predict that the plan will encourage development in Pennsylvanian and Mississippian formations in southwestern Kansas areas at depths ranging from about 5,000 to 7,000 ft., in Clark, Liberal, Meade and Morton counties. This region is designated as the Hugoton embayment of the Anadarko basin, and produces from the Chester and Maremac limestones of the Mississippian system, the Lansing-Kansas City limestones, Marmaton limestones, and the Morrow sandstones of the Pennsylvanian system.

Pool depth range, ft.—	Proportional factor
4,500	1.00
4,500-5,000	1.48
5,000-5,500	1.75
5,500-6,000	1.88
6,000-6,500	2.04
6,500-7,000	2.20
7,000-7,500	2.32

Kansas Allowable Unchanged

WICHITA.—February allowable for Kansas has been set at 325,000 bbl. daily by the state's corporation commission. The figure is unchanged from that of January.

The allowable was that recommended by T. A. Morgan, director of the conservation division. Nominations totaled 335,301 bbl. daily for February.

CANADA

Peace River Venture Planned

VANCOUVER, B. C. — General American Oil Co. will enter oil operations in the Peace River area of British Columbia, pending outcome of a stock transaction with Fargo Oils, Ltd., of Vancouver, B. C.

A. H. Meadows, board chairman of General American, has announced an agreement whereby his firm would obtain controlling interest in Fargo by acquiring 400,000 shares of a new Class B common stock of Fargo at $1 per share. In addition, the deal calls for a 5-year option to purchase another 1,000,000 shares at $1.50 per share, and a 10-year option for a second 1,000,000 shares at the same price.

Royalite to Expand

CALGARY. — Royalite Oil Company, Ltd., plans to use the proceeds from a $15 million issue of redeemable sinking fund debentures for general expansion of facilities in producing, natural gasoline, pipe line, and refining.

The company will purchase developed or semi-developed reserves of oil and gas. The program also includes the expansion of natural-gasoline extraction and sulfur-recovery facilities in western Canada. Royalite said it also plans to enter into refining and possibly the separation of L.P.G. and petrochemical basics. The company's system of pipe lines will be extended to link production with processing facilities.

We can learn from bankrupt Micawber

"MY advice, Copperfield, you know. Annual income twenty pounds, annual expenditure nineteen-nineteen-six, result happiness. Annual income twenty pounds, annual expenditure twenty-ought-six, result misery. The blossom is blighted, the leaf is withered—in short you are forever floored. As I am!"

This is probably the most famous financial counsel in all English literature, offered a hundred years ago by Charles Dickens' character the bankrupt Micawber to the hero David Copperfield. As advice it is just as good in 1953 as it was in 1849, and just as sound for a nation as for an individual.

In 17 of the last 20 years, Uncle Sam has followed Micawber's practice, not his advice. Our national balance sheet has been, figuratively, "annual income twenty pounds, annual expenditure twenty-ought-six". Ahead of us as a nation, if we continue this irresponsible policy, is Micawber's dire predicament, "blossom blighted, leaf withered—forever floored".

There is no sane reason why the world's richest nation should continue to live the financial life of a profligate bankrupt. It is time now to set our house in order. The program called for is simple: (1) Eliminate waste and extravagance in government spending; (2) Balance the Federal budget; (3) Control the national debt and reduce taxes.

By such positive action we can protect future happiness—and prevent misery—for ourselves, our children and our children's children.

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RAILROAD TRACK SPIKES - CONDUIT - HOT AND COLD FINISHED CARBON AND ALLOY BARS - PIPE AND TUBULAR PRODUCTS - WIRE - ELECTROLYTIC TIN PLATE - COKE TIN PLATE - RODS - SHEETS - PLATES.

Pilot Floods Pushed

Studies continuing on projects which would usher in big pressure-maintenance program for Wilmington, Calif.

LONG BEACH, Calif.—Pilot projects which will be the forerunners of a huge pressure-maintenance program involving injection of more than 300,000 bbl. of brine daily may get under way in Wilmington field before the year is over.

Further studies have to be made before the pilot floods are started but there appears to be little question as to the feasibility of the program. Reservoir, core analysis, and flood-pot studies already completed point to the success of water injection. Limited laboratory tests have shown complete compatibility between formation waters and sea water.

The investigation is being conducted by the Long Beach Harbor Commission on city-owned lands, in the harbor area. These properties currently are producing 60,000 bbl. of oil daily from 750 wells. If plans for unitization with other southeast-end operators are carried out, approximately 100,000 bbl. of the field's 130,000 bbl. current daily production will be under pressure maintenance.

Big output possible . . . The entire Wilmington field is generally credited with an ultimate primary production of 1¼ billion barrels of crude. Under primary recovery methods it is estimated less than 25 per cent of the tank oil in place will be recovered. Injection of water, coupled with crestal injection of gas, will at least double this recovery, the studies show.

In addition, and possibly of equal importance, it is believed the program will reduce or prevent further subsidence of the surface. Fluid and gas withdrawals already have caused a 17-ft. drop at the center of the sinking area, where the land is continuing to subside at the rate of 2¼ ft. annually.

Cause of subsidence . . . Major cause of subsidence is credited to pressure depletion in the four upper zones, Tar, Ranger, and upper and lower Terminal. Studies conducted by California Institute of Technology, and others, link the rate and amount of sinking directly to pressure depletion in these oil zones . . . location of the subsidence bowl coincides with the portion of the field in which fluid withdrawals have been greatest.

Dr. J. F. Dodge, Los Angeles consultant, who has been retained by the Harbor Commission to conduct the reservoir study, has completed preliminary studies of these four zones in fault Blocks 5-A, 5-B, and 6. A report shortly will be made on Block 4 and by mid-April studies will have been completed in Blocks 3 and 2.

Because unitization of city properties with those of offset operators will be necessary to a greater degree in Blocks 2, 3, 4, and 5-A, initial floods will be in Blocks 5-B and 6, and as both the Tar and Ranger zones extend beyond the limits of city properties, water injection will be initiated in subpools of the upper and lower Terminal.

In a preliminary report last July, it was recommended that water injection first be undertaken in a three-well subpool which contains about 1,500 acre-feet of sand *(The Oil and Gas Journal, July 21, 1952, page 43)*. Negotiations with Long Beach Oil Development Co., contract operator of this parcel, are well advanced to the consummation of this upper Terminal project.

Extension advocated . . . In a more recent report Dr. Dodge advocated extension of the program in this 3,000-ft. subpool, and in addition recommended that two deeper upper Terminal subpools in Block 5-B be placed under flood. Water injection would largely be confined to the south flank, utilizing either three or four input wells for each zone.

Injection plant . . . In fault Block 6 it was recommended that these three upper Terminal pays and one in the lower Terminal also be placed under pressure maintenance. A 10,000 bbl. per day water-treatment and injection plant, to be operated by Richfield Oil Corp., would be used in initial operations. This project is of prime importance as a preventive to subsidence in the highly developed business and residential section of Long Beach which borders on the east.

In addition to these reservoir studies, the petroleum division of the Harbor Department is conducting core analysis, flood pot, and water-compatibility tests. Likewise much study is being given to the source of the huge quantities of water which will be needed . . . approximately 300,000 bbl. daily will be required for the city properties alone.

To determine if adequate supplies can be found 100 ft. or so below the harbor bottom, a core-drilling program may be undertaken soon. Use of such naturally filtered brine, it is believed, will be much cheaper than utilizing ocean water, which will have to be freed of suspended solids and waste materials.

Elk Hills Threat

Water encroaching shallow zone of field, Navy says

WASHINGTON.—Encroachment of water on the south flank of the field is threatening the oil supply in the shallow zone of Elk Hills Naval Petroleum Reserve.

As a protective measure, the Navy is asking authority to step up production from 6,100 to 31,000 bbl. daily to head off the seeping water, and the House Armed Services Committee shortly will make an investigation of the situation.

The water threat is confined to the shallow zone which is being operated under a unit agreement with the Navy by Standard Oil Co. of California, and the deep zone has not been affected.

Land swap proposed . . . Some months ago, Standard proposed that it and the Navy make an exchange of lands, offering to give up its interests in the deep zone for a greater interest in the shallow zone with an agreement for increasing withdrawals so that over a period of time it could pull out of the reserve entirely. Whether the new development of water infiltration will influence any change in that proposal has not been indicated.

Investigation set . . . The House committee, in addition to the Elk Hills situation, plans to make a general investigation of naval petroleum reserves, with particular attention to the results of the Navy's exploration in Alaska to determine whether further activity there should be halted.

Work on New T.C.R. Unit Set

LOS ANGELES.—Construction of a new 19,000-bbl. Thermofor catalytic reforming unit at General Petroleum Corp.'s Torrance, Calif., refinery, is expected to begin in March. It will cost $10,000,000 and is scheduled for completion by July 1954. Bechtel Corp. will do the construction work.

They Pay Their Way

When you use strings of Bethlehem Sucker Rods, whether in medium-pumping duty in mild wells or heavy-pumping duty in corrosive wells, you can count on economy and good performance. For these rods are specially made in four types to meet varied oil-field requirements.

Bethlehem Sucker Rods are carefully made from high-quality steel. They come in types X, XX, X2 and "46". The X, XX, and X2 Rods are fully normalized. The "46" Rod is both fully normalized and fully tempered.

Bethlehem Sucker Rods pay their way by minimizing the need for fishing tools. And they have what it takes to stay on the job for long periods of time. They are doubly economical because they save time during unloading and handling. They reach your yard in good condition, for they come securely bound in a specially designed unit package which protects each rod against kinking.

If you would like to have complete information about Bethlehem Sucker Rods and accessories, get in touch with the nearest Bethlehem sales office or sucker-rod distributor. Or, write direct to us at Bethlehem, Pa.

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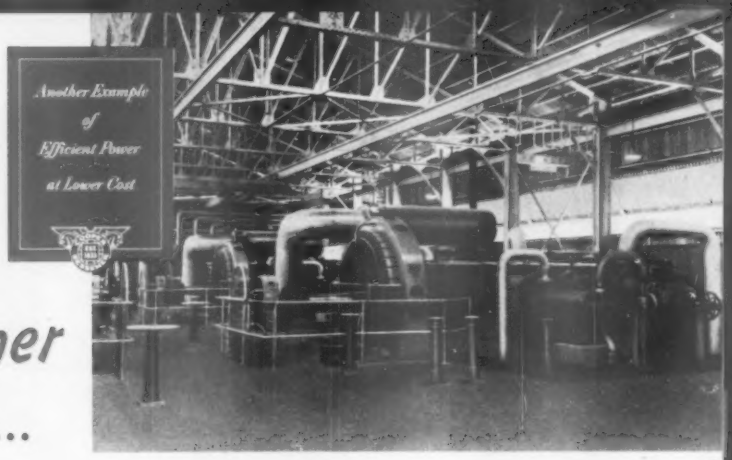


Cooper-Bessemer

MODERN DESIGN...

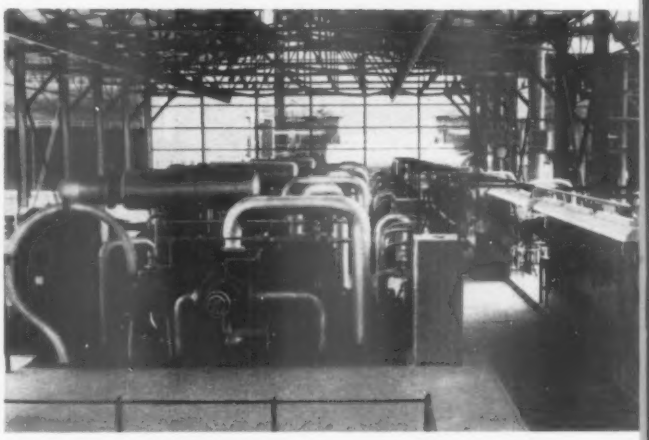
for compressors at Sindri . . . at Suez . . . everywhere!

• Shown opposite are Cooper-Bessemer motor-driven compressors in two of the world's newest and largest synthetic ammonia plants.

The top view shows part of the 22,000 Cooper-Bessemer M-Line compressor horsepower installed in the ammonia synthesis plant of the Sindri Fertilizer Factory, Bihar Province, India. Here, ammonium sulphate can be produced at a rate of 1,000 tons a day — 350,000 tons a year!

Similarly the other photo shows a line-up of Cooper-Bessemer compressors in the large Suez plant of the Societe Egyptienne D'Engrais et D'Industries (S.A.E.), Egypt. Here, calcium nitrate fertilizer is produced at a rate of 200,000 tons yearly.

In both plants, these modern Cooper-Bessemer units handle the entire compressing job and comprise the heart of production operations. For, with Cooper-Bessemers, you can be sure of year-in, year-out performance at the lowest operating cost.



Cooper-Bessemer M-Line motor-driven compressor in the synthesis section of the Sindri Fertilizer Factory, India. Here eight 2,750 hp 7-cylinder units compress gas through six stages to a pressure of 5,500 psi. The huge Sindri plant was engineered by the Chemical Construction Corp., New York, and built under the direction and supervision of the Power-Gas Corp., Ltd., England.

Here, in the Suez plant of the Societe Egyptienne D'Engrais et D'Industries (S.A.E.), these four 2,750 hp JM-5 motor-driven units compress 25,344 mcf of gas daily from atmospheric to 5,200 psi for initial calcium nitrate production of 200,000 tons yearly. This plant, engineered by the Chemical Construction Corp., utilizes waste gases from nearby oil refineries.

The Cooper-Bessemer Corporation

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MIDDLE EAST

U. S. Policy Awaited

Iran apparently marking time in secret talks on oil issue hoping that new U.S. administration will be more generous

Dahl M. Duff

THE secret negotiations which have been under way a month and a half to settle the Iranian oil problem are expected to move forward more rapidly as the attitude of the new administration in Washington becomes known.

The discussions apparently have been dragging along while the participants wanted to see what effect, if any, would result from the change over in the U. S. Government. One view was that Prime Minister Mossadegh had prolonged the negotiations in the hope that the Eisenhower administration might be more generously disposed than the outgoing Democratic regime.

Loy W. Henderson, U. S. ambassador to Iran, has been conducting the negotiations with the prime minister on behalf of the British since their diplomatic establishment in Iran was closed down last fall. In mid-January Henderson submitted to Dr. Mossadegh what was reported to be a complete draft of the new joint British-American settlement proposals.

The Iranian prime minister came back with a series of objections and questions, and the replies to these have now been formulated in London and Washington. Another meeting between Henderson and Dr. Mossadegh is anticipated in the near future, at which these replies will be examined.

Terms secret . . . The exact nature of the terms being offered to Iran are a closely guarded official secret, although government spokesmen have insisted all along that the new proposals were nothing more than elaboration of the joint offer made last August by Prime Minister Churchill and former President Truman. This called for international arbitration of the compensation issue a $10,000,000 grant by the United States, and British assistance in marketing the nationalized oil production.

There appears to be little information in the oil industry in this country on the status of the negotiations. This apparently is the case despite the fact that the terms are widely reported to provide for a new international group of American and other oil companies to handle the distribution operation.

One subject of speculation is whether a settlement, when and if one finally emerges, will contain terms which might jeopardize the existing world price structure for crude oil and products. Reports indicate the Iranians will be free to make spot sales of oil, but whether these would be at the prevailing posted price or at the discounted price given to the marketing agency is not known.

Tanker en route to Italy . . . While this slow progress was being made toward a general settlement of the dispute, another Italian-chartered tanker, the Miriella, was reported making its way to Italy with a cargo of Iranian oil loaded January 19 at Abadan. The voyage was in defiance of British warnings of legal action against exporters. The charterers, an oil-importing company of Rome known as Supor, refused to give any information on the vessel's whereabouts.

This was the second Italian-backed attempt to export Iranian oil, and it plainly was embarrassing the Italian Government. Reports indicated the Miriella would put in at a free port, either Trieste or Genoa, and that the cargo would then be re-exported behind the Iron Curtain to Poland.

This prospect raised international complications. It was reported, and later denied by an Italian Government official, that the U. S. Government had warned Italy that it ran the risk of losing United States aid because of existing American laws barring the export of strategic commodities behind the Iron Curtain.

The Italian Government presumably would be involved directly only if an effort were made to import the oil into Italy, and reports were the Supor company had not even asked for an Italian import permit.

"The Italian Government is completely out of this business," said a foreign ministry spokesman in Rome. "There is no law which forbids a ship owner from going where he wants to and picking up and delivering a cargo where he likes."

Faces injunction . . . The Supor company faces a likely injunction suit by the British whenever the ship puts in at any port. One explanation was that the company was gambling on an early

New Road-Building Process Used in Borneo

Shell engineers have adapted a bituminous process known as wet sand mix to the construction of oil-field roads in Brunei, British Borneo. Because of the lack of local stone for road foundations and surfacing, sand is used to form an embankment for the roadbed at least 2 ft. above the highest water-table level and given adequate drainage. The wet-sand mixture, 91 per cent sand with 4 per cent hydrated lime as an activator and 5 per cent special cutback asphalt, is raked over the subgrade to a depth of 4½ in. and consolidated by rollers. After a curing period of 2 to 3 weeks with an occasional rolling, a seal coat of cutback asphalt is applied and covered with a sand-crusher fines mixture. Advantages include these: mixing can be done by local unskilled labor; work can be carried on in severe tropical rains.

settlement of the entire dispute, a development which might leave it in a preferred position considering the contract it has signed with the Iranian Government to take 15,000,000 bbl. of crude and 4,000,000 bbl. of gasoline.

British take oil . . . Meanwhile, at Aden the cargo lifted last June from Iran in the tanker Rose Mary was being transferred to a British tanker. The Rose Mary was held at Aden by legal action taken by Anglo-Iranian Oil Co., Ltd., and the Aden Supreme Court subsequently upheld the company's claim to legal ownership of the oil pending settlement of the question of compensation for its properties with Iran.

Refinery Contract Let

Turkish Government accepts bid submitted by Ralph Parsons to build 6,250-bbl. plant to process country's shut-in oil

THE long-considered refinery project of the Turkish Government has been contracted to an American engineering firm.

Government officials announced in Ankara that the bid of Ralph M. Parsons, Los Angeles, had been accepted as the best of several offers. The plant will cost $7,330,000 and will have a capacity of 6,250 bbl. daily when it is completed in about 2 years. Parsons will receive a fixed fee of $425,000 for the initial facilities. The plant will be located in the field area.

The Turkish Government's Mining Research and Exploration Institute, which controls all petroleum operations in the country, discovered oil in 1948 near Mardin in the southeastern part of the country near the Syrian border in what subsequently became Ramandag field. In 1951, another producing area, Garzan, was discovered in the same general area.

The fields have been largely shut in since their discovery because of the lack of an outlet for the crude. Some production is handled in a 350-bbl. daily topping plant near the field and by burning the oil as crude in locomotives of the state railroads. Full potential of the fields is estimated at 5,000 bbl. daily or more.

Construction of a refinery has been under consideration since shortly after development of Ramandag began. In announcing acceptance of the Parsons bid, the Turkish officials said that American engineers would operate the plant during the first year. Ramandag produces a heavy, 20°-gravity oil, while the production from Garzan is 26° gravity.

Monopoly may end . . . Reports over the last year indicate that the Turkish Government is preparing to end the long-held government monopoly on exploratory operations in the country. Behind this step is a realization of the necessity for foreign participation in the heavy expenditures required if Turkey is to develop any sizable oil production.

One of the recent statements on this change of policy was that made by the Turkish minister of industrial development in the parliament. He said the government's new policy would be applied in two stages, (1) cooperation with recognized experts to determine the best methods and policies to be applied to oil exploration and development, and (2) cooperation with such domestic and foreign firms as submit the most favorable terms and conditions to Turkey.

Poor results cited . . . The minister said that the results of the government oil exploration and development carried out since 1933 had failed to yield satisfactory results so long as Turkey has had to rely solely on her own financial resources. A new law has been prepared in parliament to clarify the government's policy. Turkey's plans have been widely hailed as an instance of "oil denationalization" following the failure of a state-controlled operation.

No terms set . . . The exact terms and conditions under which foreign capital might operate in Turkey are apparently yet to be worked out. They could be either spelled out in a law or left to individual government-company negotiations. One American oil executive representing a company which might consider Turkish operations said there is little that can be done until the new policy is placed on a more definite basic by the Turkish Government.

Guests of the Houston Nomads

Visitors attending the January meeting of the Houston chapter of Nomads included, left to right, Guy Woodruff, Mene Grande Oil Co., Barcelona, Venezuela; W. O. Calvert, manufacturing representative, London, England; H. W. Kendrick, Gulf Oil Corp., Houston; S. M. Sims, Iraq Petroleum Co., London; Oscar B. Irizarry, editor of Petroleo Interamericano, Latin American affiliate of The Oil and Gas Journal, Tulsa; and E. J. Huber, Shell-Condor, Barranquilla, Colombia. Irizarry was principal speaker.

LATIN AMERICA

Disputes Settled

Auctions in Peru solving acreage-overlap filings

OVERLAPPING and duplicating applications for concession acreage under Peru's new petroleum law are being settled in a series of auctions which began last week in Lima.

The auctions are being conducted by the Ministry of Development in accordance with terms of the law and regulations which provide this method of awarding tracts filed on by more than one applicant.

The filing period for foreign operators opened October 28, and in the initial rush of applicants, the best prospective area, the Sechura Desert in the coastal zone, was completely covered by applications, many of them overlapping. The total asked in the coastal zone mostly the Sechura, aggregated about 6,300,000 acres.

In addition, five Peruvian-owned companies filed for concessions last August when the government held a 30-day preferential filing period for

Another new development using

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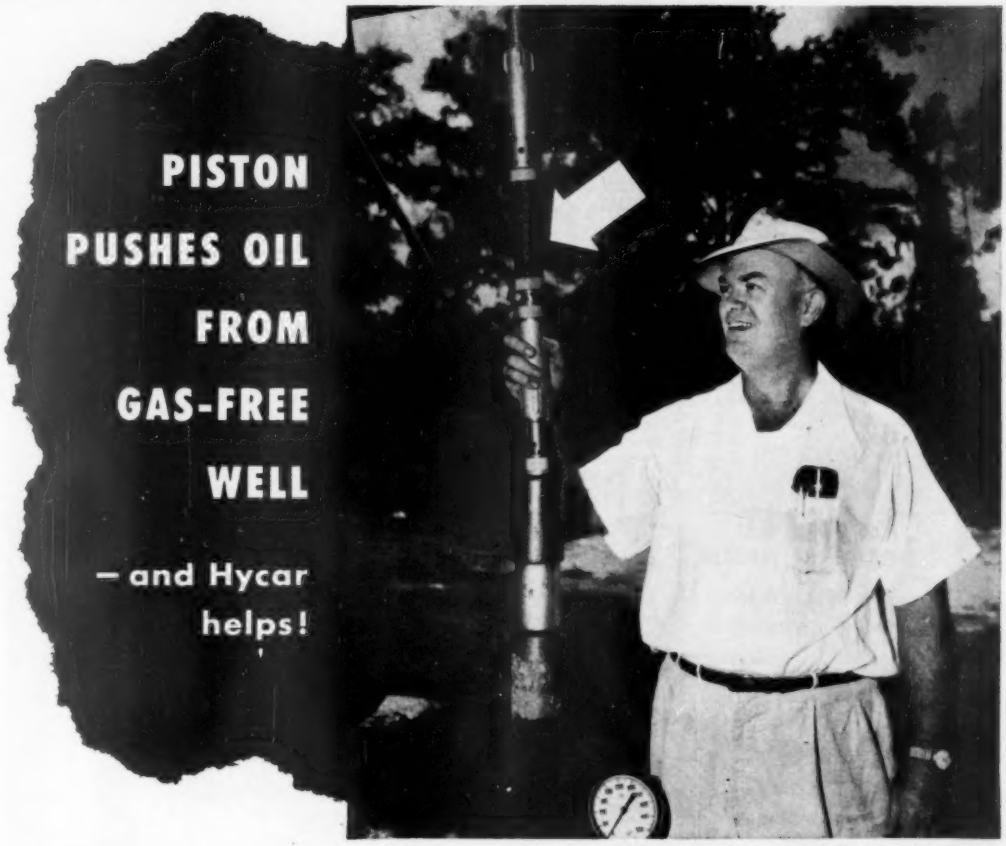

GOT Free Piston made by Garrett Oil Tools, Inc., Houston, Texas. Packing element molded by Murray Rubber Company, Houston, Texas. B. F. Goodrich Chemical Company supplies the Hycar rubber only.

THE Free Piston pictured here is a big help in bringing oil to the surface from wells that have lost natural gas pressure. Inserted in the tubing string, it falls to the well bottom. Gas injected below the piston causes it to rise, pushing the column of oil above it to the surface.

Important to the operation of the Free Piston is a highly flexible packing element made with Hycar rubber. As the piston rises, the Hycar packer expands against the inner wall of the pipe, forming a seal to carry the fluid column to the surface. Upon surfacing, the pressure is released. The packer collapses, the piston returns to the well bottom and the cycle is repeated. Some Free Pistons, running once an hour in 8,000 foot wells, are in top condition after 6 months of this tough service.

Hycar has many applications in the petroleum and in other industries, because it effectively resists oil, gas, grease, abrasive fluids, heat, cold and many chemicals. Perhaps Hycar can help your product development or improvement plans. For technical information, please write Dept. HJ-2, B. F. Goodrich Chemical Company, Rose Bldg., Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

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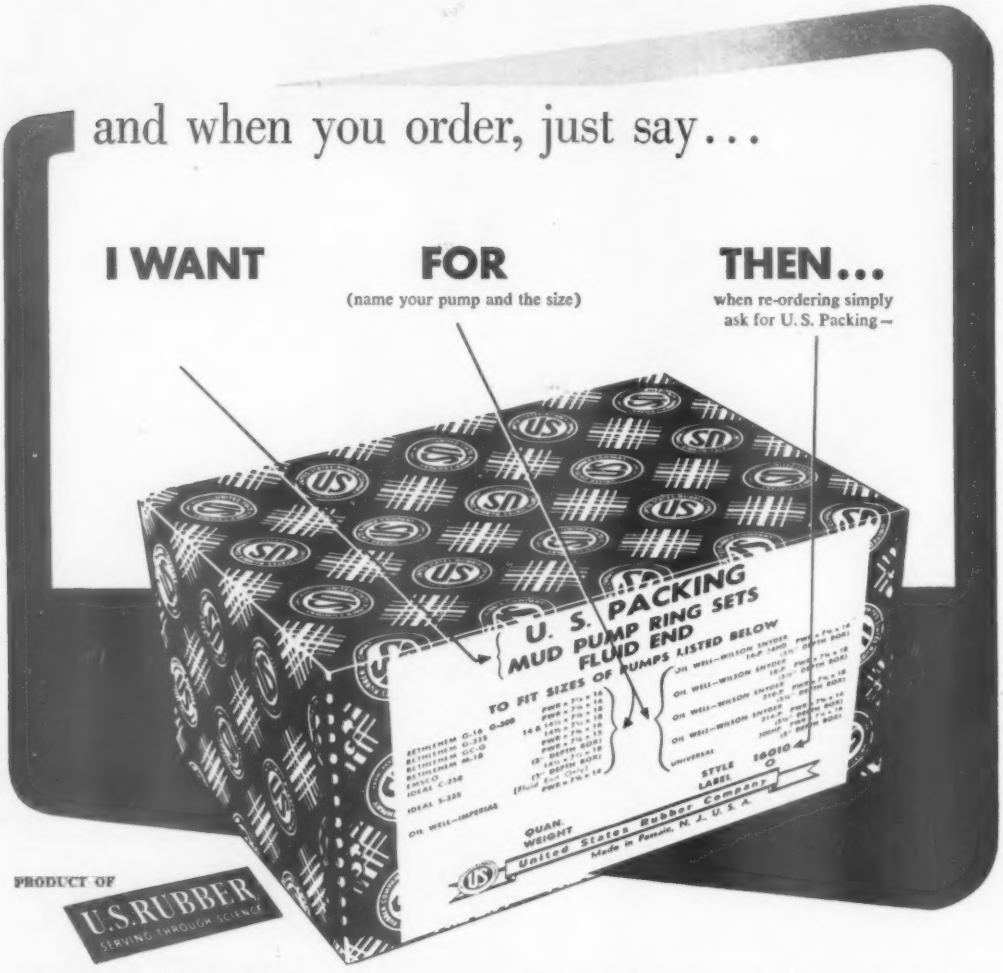

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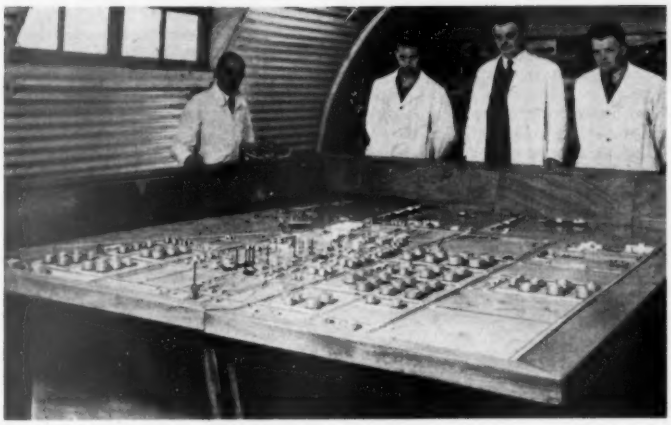


Venezuela's Cardon Refinery in Miniature

This large-scale, detailed model is of the Cardon refinery of Shell Caribbean Petroleum Co. in western Venezuela. It was built by a group in the model-making section of Shell's Thornton Research center in England and subsequently shipped to Venezuela. In the picture are members of the research-center staff who worked on the model. Left to right are F. White, N. B. Davies, E. B. Michael, and E. Devine. The Cardon refinery soon will complete an expansion program under which crude capacity has been increased to 145,000 bbl. daily, exclusive of the 25,000-bbl. daily intake capacity of cracking plants for heavy crude. (A Shell photo.)

Peruvian firms, allowing them to apply for up to 10 per cent of the Sechura area. Several of these companies later asked more acreage when the general filing for all operators, foreign as well as national, began October 28.

Big task . . . The ministry has faced a major task in straightening out all these applications, many overlapping, some carrying priority, and others not. What is now reported to be under way is a process of consolidation and merger of interests by a number of the companies involved. Out of this is expected to emerge eventually probably half-a-dozen separate groupings, with some companies buying out the rights of others and some entering into operating arrangements. Much of this is dictated by the necessity of getting together a sufficiently large and promising block to justify the exploration expenditure.

Americans file . . . The October filings were made by five American companies, Peruvian Gulf, International, Richmond, Conorado, and Ganso Azul; two Canadian firms, Seaoil, Ltd., and Peruvian Oils & Minerals; two backed by Argentine interests, Cia. Sudamericana and Peruvian Oil Concessions; and four Peruvian companies, Consorcio Minero, El Oriente, Petrolera Peruana, and A. & F. Wiese.

Import Regulations Issued

The Colombian Ministry of Mines and Petroleum has issued regulations implementing the decree-law of September 24 which granted exemption from import duties to drilling equipment, accessories, and spare parts.

The exemption was part of the program of the Colombian Government to provide additional inducements encouraging the search for oil in the country. Other laws have liberalized the country's general petroleum legislation and eased the tax burden on operators.

The regulations specify that the exemption applies to heavy equipment used for wildcatting, excluding seismograph core drills and other material used in geological and geophysical work. Mud chemicals also are excluded from the exemption.

AUSTRALIA

Work Starts on New Refinery

A ground-breaking ceremony was held January 31 to Kwinana, near Fremantle, in western Australia, to mark start of construction on the new 100,000-bbl. daily refinery of Anglo-Iranian Oil Co., Ltd.

Anglo-Iranian was represented at the ceremony was D. W. K. Barker, head of the Australasian division of Anglo-Iranian's refineries department, and by A. E. Mason, manager of Australasian Petroleum Refinery, Ltd., the company formed to build and operate the refinery.

Preliminary work grading and leveling the site got under way earlier at Kwinana, along with the construction of a camp to house building workers. The first shiploads of materials, mainly steel plate for tankage, reinforcing steel, jetty equipment, and construction machinery, are now en route from the United Kingdom and the United States.

Shell Pipe Line Approved

Construction of a 58-mile, 8-in. products pipe line by Shell Co. of Australia, Ltd., has been authorized by the Victoria State Cabinet in Australia.

The line will extend from the new refinery which Shell has under construction at Geelong southwest of Melbourne, to Newport. It will be built of Australian steel and will cost the equivalent of $1,350,000.

Plans call for completion of the line early next year so that it will be ready to move the initial output of products from the new refinery. The plant itself will have a capacity of about 25,000 bbl. daily and will cost an estimated $25,000,000.

AFRICA

Permit Granted

Conorado to prospect in large area in Somaliland

EXPLORATION rights over an area of about 36,000 sq. miles in the British East African Protectorate of Somaliland have been granted a group representing three American companies.

The prospecting permit is held by Continental Oil Co., Ohio Oil Co., and Amerada Petroleum Corp. through a Canadian subsidiary. A geological party is about to begin work in the area as the first step in the exploratory program.

Terms of the permit are reported to be in line with the standard type of exploratory concession granted in British territories with some modifications. It was negotiated by A. A. Curtice, president of Conorado Petroleum Corp. with the governor-general of the protectorate in Berbera, the chief town. Conorado is the joint subsidiary of the three companies which handles exploratory operations outside the United States and Canada.

The permit grants exclusive rights for a period of 2 years with an option for a 1-year renewal. It carries the privilege of conversion into a full exploration concession and, if commercial production is obtained, into an exploitation concession or lease.

Permit area . . . The area covered is in the southern part of the territory bor-

dering on Ethiopia and the Italian-administered territory of Somalia. Shell and Anglo-Iranian Oil Co., Ltd., made a preliminary investigation of the area about 2 years ago, but later abandoned the work. The Somaliland protectorate has a total area of 68,000 sq. miles and a population of about a half a million.

Last fall, the same three companies took a one-sixth interest each in the exploratory concession which the Sinclair organization obtained in May from Italian authorities in Somalia *(The Oil and Gas Journal, November 17, page 252)*. Sinclair holds a concession by itself over a large part of Ethiopia and is now drilling a second wildcat well on which little information has been released to date.

Africa getting more attention . . . The Conorado operation in the British Somaliland Protectorate is indicative of the increasing attention being shown in oil exploration on the African continent. Shell and Anglo-Iranian recently announced plans for a comprehensive program in the Kenya - Tanganyika coastal plane. Several French companies, including Cie. Francaise des Petroles, are starting work in the Sahara Desert in southern Algeria, and Shell also is seeking a concession in this region.

EUROPE

Octane Clamp Eased

Britain abolishes restrictions in force for 13½ years to permit return of premium-grade gasoline to market

PREMIUM-GRADE, branded gasoline returns to the market in Britain this week for the first time in 13½ years.

British Government restrictions limiting gasoline sales to the single "pool" grade of between 70 and 72 octane ended February 1. The prohibition has been in effect since the outbreak of war in Europe in September 1939.

February 1 was designated Brands Day as the oil companies during recent weeks made preparations for a resumption of competitive marketing in the biggest petroleum consuming country in Western Europe. The job of insuring that every one of the 27,500 garages in Britain had the higher grade gasoline available for sale involved supplying some 50,000 pump outlets along with new terminal storage and transportation arrangements. This work was in addition to the normal task of meeting demand for the pool-grade gasoline until the end of the month.

Before the war, two of every three British motorists used premium-grade gasoline. Estimates are that the percentage will be even higher now, despite the fact that the premium grade will cost 3 and 4d (the pence is worth slightly more than 1 United States cent) additional, as compared to a 2d differential before the war.

Arguments convincing . . . The decision of the British Ministry of Fuel and Power last September to lift the restrictions against higher-octane motor fuel followed lengthy negotiations with the oil companies which argued that the step would mean better service under competitive conditions and that the higher octane would allow fuller utilization of the catalytic cracking equipment erected at British refineries during the last few years.

Consumption of gasoline in the United Kingdom amounts to about 135,000 bbl. daily. Britain is now served by an expanded domestic refining industry which will have a capacity of around 550,000 bbl. daily with the completion of the new Kent and Coryton refineries during the coming months. With a new unit at Kent, total catalytic cracking capacity will amount to nearly 100,000 bbl. daily.

Shell-Mex and B.P., Ltd., the distributing company for Anglo-Iranian Oil Co., Ltd., and Shell in the United Kingdom, announced it would sell two grades and that the higher premium, Shell and BP Super, would be retailed at 3d per gallon above the price of the second grades.

The Shell-Mex and B.P., Ltd., second grade will be sold at the equivalent of the old controlled pool-gasoline price. The companies agreed to this price for the second grade at the time the ministry worked out the plans to allow marketing of the higher octane.

Competition evidenced . . . An indication of the revived oil-company competition was given when Esso Petroleum Co., Ltd. (Standard Oil Co., N. J.), announced a different plan under which it will market three grades of branded motor fuel. Esso Extra will sell at 4d above the old pool price, Esso Mixture for 2d more, and Esso at the pool price.

It had originally been expected that all the companies would provide only the two grades, one of the premium of 80 octane, and the other similar to the pool product. After Esso's announcement, Shell-Mex & B.P., Ltd., said its own two-grade policy would not be changed. "We do not see the advantage of adding to the multiplicity of grades in a manner which can only increase distribution costs," said C. M. Vignoles, Shell-Mex and B.P. managing director. Regent Oil Co., Ltd. (Caltex and Trinidad Leaseholds, Ltd.) also said it would not alter its two-grade policy.

The Esso organization apparently was making ready for a vigorous attempt to capture a greater part of the U.K. motor-fuel market. Leonard Sinclair, chairman and managing director, said Esso-extra would be a "superlative quality spirit never before available in the country," and that it was produced by a combination of catalytic cracking and polymerization at the company's new Fawley refinery near Southampton.

Esso Mixture, he said, was designed for motorists for whom the highest quality gasoline was not essential. The company said its three-grade marketing plan would meet the needs of all automobile owners, regardless of the vehicles' age, type, or performance.

British motorists already pay a stiff price for gasoline, but more than 60 per cent of the total is represented by the British Government's tax on the product. In the so-called inner zones nearest the main distribution centers, pool-grade gasoline has been selling for 4/2¾d which is the equivalent of about 49½ cents per United States gallon. Thus, the price of the highest premium grade, Esso-extra, will be equivalent to about slightly more than 53 cents per United States gallon.

Sicilian Lands Going Fast

Concessions covering 319,339 hectares, or approximately 787,000 acres, have been granted to foreign-owned companies searching for oil and gas in Sicily.

This total includes 99,994 h. to American International Fuel & Petroleum Co. (Gulf), 100,607 h. in four concessions held by Macmillan Petroleum Corp., and 91,464 h. in three concessions granted to D'Arcy Exploration Co., Ltd. (Anglo-Iranian). American International Fuel & Petroleum also has obtained another concession of 112,400 h., or about 306,000 acres, in central Italy.

Italian petroleum laws have discouraged foreign-backed exploration in Italy itself. Sicily, however, has its own petroleum law under regional autonomy, any this offers workable terms to foreign oil capital.

Conservation Leader

O. C. Bailey is veteran of early days in Smackover

O. C. BAILEY, a copartner in the firm of Bailey & Trimble, El Dorado, Ark., is widely known for his leadership in conservation groups.

His partnership with J. D. Trimble dates back to 1923 when they began operating in Smackover and other local oil fields. Today the firm also has producing properties in Texas.

He has been chairman of the Arkansas Oil and Gas Commission since its formation in 1939. From 1937 to 1939 he served as chairman of the Arkansas Board of Conservation.

During World War II he was Arkansas representative on the National Conference of Petroleum Regulatory Authorities.

Since 1942 he has represented Arkansas on the Interstate Oil Compact Commission and at present is a member of the commission's executive committee. He also is serving his second 3-year term as a member of the executive committee of the Independent Petroleum Association of America.

In spite of his key role in the oil industry Bailey manages to retain an interest in local affairs. He recently was elected to the board of directors of the First National Bank of El Dorado. He is treasurer and secretary of the board of trustees of the First Methodist church and is active in the local Red Cross, Community Chest, Youth Council, and Chamber of Commerce.

Homer J. Smith has been named general manager for the Colombian activities of Socony-Vacuum Oil Co., Inc. He succeeds **R. W. Merritt,** who has retired.

D. W. Ross has been made assistant manager in charge of operations for Texas Petroleum Co. in Colombia. He succeeds **C. W. Saville,** who has been transferred to the New York office. **John J. O'Keefe** has been named general field superintendent for the company, and **J. G. Youngblood,** assistant to the general field superintendent.

Ludlow Shonard, Jr., has been elected vice president of Southern Counties Gas Co. He previously was manager of personnel and claims.

J. Ralph Coleman is now in Fairbanks, Alaska, as manager of Arctic Contractors' oil operations for the U. S. Navy in northern Alaska. Coleman formerly was assistant production superintendent for Tennessee Production Co., Houston. Previously Coleman was associated with **Bart Gillespie** at Mexico City in administration of Mexican American Independent Co., and before that was associated with Gillespie when he was manager of Arctic Contractors' initial operations for the Navy in Alaska.

J. S. Leach, president of The Texas Co., has been named to succeed **W. S. S. Rodgers** as chairman of the board and chief executive officer. Rodgers will retire from the company March 1. **A. C. Long,** executive vice president, will succeed Leach as president on that date. **Col. Harry T. Klein,** chairman of the executive committee, also will retire April 1. Both Rodgers and Klein will remain as members of the company's board of directors and as members of the executive committee. Leach joined Texaco in 1916 and become a vice president in 1938, executive vice president in 1950 and president in April 1952. Rodgers has been with the firm more than 37 years and served as president from 1933 until his election as board chairman in 1944.

J. S. LEACH

A. C. LONG

R. W. Faulk, manager of the manufacturing department of Shell Oil Co. of Canada at Toronto, Ont., has been named superintendent of the company's Norco, La., refinery.

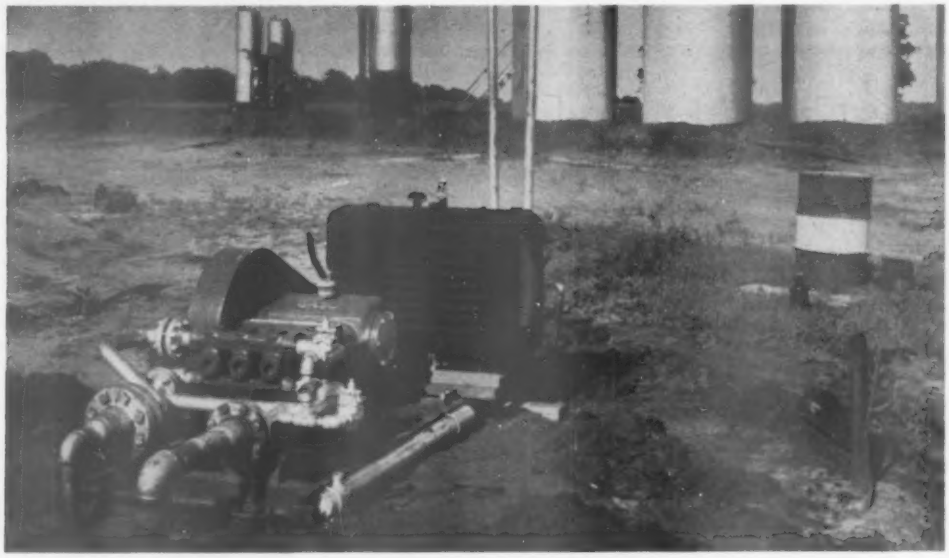
Rex L. Dawson, who was connected with Standard Oil Co. (N. J.) affiliates for 35 years, has retired and is now located in Denver. He joined Carter Oil Co. in 1918 and served that company in various capacities until 1948, when he joined Imperial Oil, Ltd., as head of the land and scouting department with headquarters in Calgary, Alta. He continued in that position until this month. He expects to engage in the oil business later as a consultant.

Allen R. Heidebrecht, senior electrical engineer for Platte Pipe Line Co., has been promoted to chief engineer at Kansas City. Heidebrecht was graduated in 1934 from Kansas State College, Manhattan, and joined Platte in 1950 after being associated with Kansas Gas & Electric Co. for 16 years.

Dr. Robert W. Schiessler, Pennsylvania State College professor, will receive the $1,000 Precision Scientific Co. award in petroleum chemistry in Los Angeles March 16. Dr. Schiessler is director of the American Petroleum Institute's "Project 42" at Pennsylvania State which deals with investigation of pure hydrocarbons in the lubricating-oil range, their synthesis, and the correlation of their chemical structure with their physical properties. The award is made by the American Chemical Society.

Jack L. Coulson, Warren Petroleum Corp., has been elected chairman of the West Central Texas section of the American Institute of Mining and Metallurgical Engineers. Other officers are: **Dalton Moore, Jr.,** Wimberly Field Unit, vice chairman; **J. B. Jenkins,** Stanolind Oil & Gas Co., second vice chairman; and **James E. Russell,** Reddin Operators Committee, secretary-treasurer. All are from Abilene. Named to the board of directors were: **L. H. Kaltenberger,** Chemical Process Co., Breckenridge; **Jack Evans,** Warren Petroleum Corp., Abilene; and **A. J. Carroll,** Abilene Sample Log Service. **Fred W. Nussbaumer,** Halliburton Oil Well

On the Line . . for Years to Come



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Cementing Co., past A.I.M.E. chairman, was elected an honorary member of the board.

Harry A. Swem, assistant general manager of Texas Gulf Sulphur Co., has been elected vice president and manager of production. **Herbert E. Treichler,** vice president and general manager, has resigned as general manager but will continue as vice president. Offices of both officials will remain in Newgulf, Tex.

P. R. Ratliff, formerly with International Petroleum Co., Ltd., in Peru, has been named general manager of Andian National Corp. which operates a major export pipe line in Colombia. He succeeds **W. C. Kirkpatrick,** who has been transferred to duties in the United States.

Marlowe D. Melvin has resigned as chief geologist for Ryan Oil Co. at Evansville, Ind. He will do independent geological work in that area.

E. P. Hayes, formerly chief petroleum engineer for The Texas Co., has been appointed chief petroleum engineer of the producing division of California Texas Oil Co., Ltd. Hayes has been with The Texas Co. since 1933 and has served as South Texas division engineer. He also formerly served in the petroleum division of the Bureau of Mines at Bartlesville, Okla., and Dallas.

Dudley Tower, operations manager for the Gulf division of Union Oil Co. of California at Houston, has been elected a director of the company. **Frederic H. Brandi,** president and director of Dillon, Read & Co., New York, also was elected a director, succeeding **Herman Phleger,** San Francisco, who has resigned.

E. C. Michels, Ponca City, Okla., pipe-line engineer for Continental Pipe Line Co., has been named superintendent of Pioneer Pipe Line Co. at Salt Lake City. Sixty-five per cent of Pioneer is owned by Continental Oil Co. and 35 per cent by Sinclair Pipe Line Co. Michels will supervise operation of Pioneer's new 8-in. products pipe line from Sinclair, Wyo., to Salt Lake City.

Top Men of National Constructors' Labor Committee

The labor committee, one of the most important in the National Constructors Association, is headed by Paul S. Klick, Jr., center, personnel director for Foster Wheeler Corp., New York. He is flanked by Vice Chairman F. R. Stevens, left, personnel manager of Stone & Webster Engineering Corp., Badger Process Division, Boston, and B. O. Yedell, right, labor-relations manager for Ford, Bacon & Davis Construction Corp., Monroe, La. The photograph was made at the recent annual meeting of the association in New York. **For a story on this meeting, see page 119.**

Russell M. Riggins has been elected a director and president of Texas Gas Corp., and of New Ulm Corp., Houston. Other officers and directors named recently include: **H. Hugh McConnell,** director; **Walter H. Saunders, Jr.,** director; **Warner H. Mendel,** director; **Herbert R. Eldridge,** director; **Hugh V. Miller,** director and vice president; **P. W. Riggins,** director and vice president; **John T. Ashford,** vice president; **A. C. Gladden,** secretary and treasurer; **T. S. Curran,** controller; and **H. H. Martin, Jr.,** assistant secretary.

Edward C. Ingram, Library, Pa., has been elected general superintendent of New York State Natural Gas Corp., Pittsburgh. Inghram formerly was superintendent of production and storage for the company. He recently supervised beginning work on the Oakford storage pool, the largest gas storage project in the world, which was a joint development of New York State Natural and Texas Eastern Transmission Corp. near Delmont, Pa.

Jerome J. O'Brien, formerly vice president of Monterey Oil Co. of Texas, has been named president of Monterey Exploration Co. at San Antonio. The former company is being liquidated; the latter is a wholly owned subsidiary of Monterey Oil Co.

R. V. Shankland has been promoted to senior research associate in the Standard Oil Co. (Ind.) laboratory at Whiting, Ind. He has been succeeded as section leader on catalyst research and development by **G. M. Webb.** In the analytical research division **H. M. Grubb** has been promoted to section leader and **C. H. Ehrhardt** and **R. R. Hopkins** to group leaders. Shankland joined Standard in 1930 as a chemist and has been a section leader since 1948.

DR. SHANKLAND

I. M. Hughes has been appointed assistant general manager of International Petroleum Co. of Colombia. He formerly was with the parent International Petroleum Co., Ltd., at its Coral Gables, Fla., headquarters. In Colombia he succeeds **M. M. Brisco,** who has been transferred to Peru as International's assistant general manager at Lima.

W. W. Reichenbach has been appointed manager of the oil supply and exchange department of General Pe-

PERSONALS

troleum Corp., Los Angeles. He has been assistant manager of the department since 1949.

Hugh A. Neal has been named manager of the new petrochemical division of Air Products, Inc. The division will have offices in Houston.

J. W. Foley, assistant to the chairman of the board of The Texas Co., has been elected a vice president. He will continue to serve as assistant to the chairman of the board. Foley joined the company in 1932 as a rotary rig helper and has served as petroleum engineer, assistant Oklahoma division manager at Tulsa and assistant to the vice president in charge of the producing department at New York.

Dean C. Glass has been named superintendent of pipe-line operations for Pure Transportation Co. at Chicago. He will continue to report to **Joseph W. Meehan,** general manager of crude-oil purchasing and pipe lines.

J. M. Powers, has been appointed head of the newly created research section 1 of Humble Oil & Refining Co. at Baytown, Tex.

C. R. Couper has been appointed assistant Pacific Coast division manager for The Texas Co.'s producing department at Los Angeles. He formerly was division land and leaseman in the division.

E. E. Marshall, assistant Conroe district superintendent in the Gulf Coast division of Humble Oil & Refining Co., has been promoted to Livingston district superintendent, succeeding **Lee Ellzey,** retired. Marshall has been replaced at Conroe by **E. E. Byrd,** formerly acting superintendent of the Means district in West Texas. **Jim Stephenson,** assistant Friendswood district superintendent in the Gulf Coast division, has been promoted to Hardin district superintendent. **W. W. Denyer,** assistant district superintendent at Anahuac, Tex., has succeeded Stephenson at Friendswood. In West Texas, **L. E. Rhodes,** assistant superintendent of the Means district, has been appointed acting district superintendent.

Capt. E. E. Kerr will relieve Comdr. **W. M. Gustafson** as inspector of Naval Petroleum Reserves in California some time in February.

Harold R. White has been appointed district geologist for Seaboard Oil Co. of Delaware at Jackson, Miss. He formerly was with Pure Oil Co. at New Orleans.

Baker B. Ingram, McCamey, Tex., has been named president of Gay, Inc., a drilling concern with headquarters in Odessa, Tex. Since 1945 Ingram has operated the Ingram Welding Works and Ingram Well Servicing in McCamey. Prior to that he served in various positions in the drilling, production, production research, gas, and petroleum - engineering departments of Humble Oil & Refining Co.

E. L. Mount, division geophysicist for Continental Oil Co. at Midland, Tex., has been promoted to assistant regional geophysicist at Oklahoma City, where he will assist **W. C. Hawk,** regional manager of exploration. **J. E. Finley,** supervisor of the central region geophysical section at Oklahoma City, has been transferred to Roswell, N. M., and promoted to division geophysicist for the southwest region.

DEATHS

Martin A. Gehling, Falls City, Neb., manager of Louisiana Nevada Transit Co., died January 16 in Hope, Ark. He was a pioneer in the pipe-line industry and held various positions with Oklahoma Contracting Co. He joined Louisiana Nevada in 1939 as division superintendent and was promoted to manager in 1940.

Charles R. Dawalt, Sr., 51, a foreman in the Bayway refinery of Esso Standard Oil Co. in Linden, N. J., died January 19 of a heart attack.

Albert Medearis, 62, transport dispatcher for Richfield Oil Corp. the past 30 years, died recently in Montebello, Calif.

Harry Curtiss Patterson, 80, who retired in 1939 as superintendent for Pure Oil Co. in Nowata, Okla., died there January 25.

John F. Strayhorn, Jr., 45, tax department official of Service Pipe Line Co., died in Tulsa January 25.

James Allen Oliver, 56, Hardin, Tex., production foreman for Humble Oil & Refining Co., died January 20 in Houston.

Thomas L. Taggart, manager of the natural-gasoline department of Standard Oil Co. of California since 1942, died in San Francisco January 22. He had been with the company since 1927.

Ernest Orville Stough, 48, geologist for Tide Water Associated Oil Co., died in a Tulsa hospital January 23.

Harry Joseph Strief, Sr., 63, Dallas oil operator, died January 19 while on a business visit in Shreveport. He formerly was a partner in Primrose Refining Co. and in 1932 organized Union Refining Co. in Longview.

W. Lacy Rosier, 66, past president of the Kansas Oilmen's Association, died in Colorado Springs, Colo., January 15. A native of Kansas, he retired from the oil marketing business in 1947 and moved to Colorado Springs.

Gordon B. Morris, 68, Los Angeles, who had been secretary-treasurer of Calstar Petroleum Co., died January 7 aboard the ocean liner President Polk.

Joe Howard Payne, 68, retired vice president and director of Standard Oil Co. of California, died at his home in Tucson, Ariz., January 24.

Eddie Brooks Baxter, 90, who was active in the development of Central Oklahoma fields, died at his home in Tulsa January 25.

Alvin J. Benninger, 68, Shippenville, Pa., retired superintendent of McCoy & Tionesta Gas Co., died January 17 at his home there.

Iltyd H. Geare, 67, for 29 years Far Eastern sales executive for Vacuum Oil Co. and Standard Vacuum Oil Co., died January 24 in a Bryn Mawr, Pa., hospital.

Thomas Osborn Mason, 62, who had extensive oil holdings in Rusk County, Texas, died January 21.

Dr. Henry Rachford, Jr., Humble research scientist, gets printed results from electronic computer installed at Houston headquarters.

THE ELECTRONIC AGE IN COMPUTING

Here, in eight articles, is related how new engineering robots are revolutionizing tedious and time-consuming computations in all phases of the oil industry

"ELECTRONIC computers are paving the way to a new engineering vista. They not only are removing mathematical drudgery which besets many engineering problems but, most important of all, are permitting the solution of long and involved equations which heretofore were stumbling blocks in many research programs."

A Humble Oil & Refining Co. engineer was speaking.

"We've been using these calculators to solve relatively simple distillation problems involving repetitive computations and we've been attacking complicated differential equations such as are encountered in reservoir engineering. To date, we've had the machines perform in a wide variety of services and, at that, still feel we have barely explored their potentialities."

Although the engineer with Humble was speaking of a single integrated company, this technical man was echoing views being expressed more and more, as the impact of the electronic calculators upon industry continues to be felt in increasing intensity. However, while the advent of the computing machines has been termed by some enthusiastic observers as the beginning of a "second industrial revolution," their great potentialities do not portend the obsolesence of the engineer or his slide rule. Rather, they represent improved tools which both relieve the engineer of hamstringing detailed calculations and permit increased utilization of his technical skills in the attacking of more complex engineering projects, an invaluable contribution in these days of limited technical manpower.

How it work . . . The easiest way to describe the electronic computer is to refer to it as an "impulse counter." In rapid fashion—50,000 pulses per second—it counts the electronic impulses with which are performed the arithmetic operations in the solution of a mathematical problem. Thus the integration of differential equations becomes the counting of increments between certain desired limits, and the increments are totaled as impulses by the electronic brain. Instead of a laborious tracing through of such calculations by a mathematician, the machine breezes through 300 individual computing steps per second.

The particular installations being used by Humble each consist of four units:

1. The input-output unit into which is fed punched cards which direct the machine to perform the necessary steps to solve the problem. This unit incorporates a printer which can be used to print the desired data on a continuous roll of paper. Signals from the input-output unit may be directed to either or both of two units.

2. One of these, the memory box, will store the desired information until required by a later computational step(s).

MONROE CALCULATING MACHINE CO. . . .

This company's new Monrobot is a general-purpose, sequence-controlled electronic calculator. The model shown has magnetic drum facilities for one-hundred 20-digit decimal numbers with algebraic sign and 200 operational orders. Any numerical method using the basic arithmetic operations and choice's based on comparison and equality may be programed for the machine.

The computer accepts and handles 20 decimal digit numbers with the decimal point fixed centrally. Programing is thus comparable to planning a calculation for a desk calculator.

All operational commands are in their familiar algebraic form. Numbers and commands may be entered through a simple 10-key keyboard or via paper tape prepared on a Flexowriter. Calculated results are selectively printed out and punched on tape by an electric typewriter or high-speed electronic printer.

A single operator of desk-calculator caliber is more than adequate for entering data and doing the manual operations (key-board, tape) sometimes necessary. A programer with some background in oil or gas computations should find it relatively simple to plan a calculation for the Monrobot.

The electronic design emphasizes reliability instead of great speed. The use of "plug-in" units as basic elements of the circuitry permits a rapid replacement of any malfunctioning part.

●

CONSOLIDATED ENGINEERING CORP. . . .

The double benefits of time saving and error reduction are obtained when Consolidated Engineering's new Spectro-Sadic is used in conjunction with analytical mass spectrometer in analytical work, and particularly so in refining and petrochemical work, where large numbers of very similar mixtures must be assayed daily in standard control work. Data-reduction time, a major portion of the total time required in mass-spectrometric analysis, is cut sharply, greatly increasing the utility of the method, often the only practical method of complex mixture analysis.

Direct, automatic conversion of mass-spectrometer data into digital form of 0.1 per cent accuracy eliminates the picking of individual peaks on graphic records and thus practically eliminates human error. Digital values of peak heights are available immediately after the scan in either punch-card form for direct insertion into I.B.M. calculators or in tabulated form for substitution in matrices and subsequent reduction by other computing methods. Only 10 seconds are required to scan a mass number and record its peak height. Forty peaks, for example, require only 6 minutes, 40 seconds, at the end of which time peak-height figures may be read directly from the tabulation.

How Humble Uses Electronic Computers . . .

3. The other unit is the actual electronic computer, which takes incoming signals and in sending them through some of its more than 1,500 tubes, comes up with the resultant figure for the instantaneous calculation then being made. The signal generated by the computer is then transferred to either or both the memory box or input-output unit.

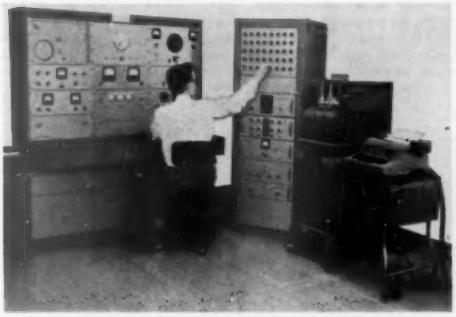
4. The data thus obtained from the computer can then be punched out on another card by an electronic punch-card machine which operates in coordination with the other three units.

In setting the machine up for a problem, a control unit is originally wired so that the machine will respond as instructed by the cards. Instruction cards may be retained as desired so that problems which are encountered frequently, such as plate-to-plate distillation and flash-vaporization calculations, will not have to be specially set up on the control panel. This, when previously wired, may be plugged into the computer in a matter of seconds. The approximate boundary conditions are set up for the problem, the degree of accuracy desired is determined, coding of the problem on a limited number of cards is next, and finally, the cards are fed to the input-output unit and the solution achieved in a minute fraction of the time normally required.

Humble's machines . . . Perhaps the best way to illustrate the value of the machines to the petroleum industry is to show their growing usage in the engineering departments of an integrated oil company, such as Humble. At the present this company has two leased installations—called electronic digital computers. One is operated jointly in Houston by the production research division and the petroleum engineering division, with the second located at the Baytown, Tex., refinery and used both by the technical services group and the research and development section.

The initial use of computational machines at Humble, as at most companies, was in the accounting department where they were widely used in handling payrolls and inventories. With the machines being available, it was a natural followup that they would be utilized by engineering and research staffs and as the potentialities of machine computers were found to be quite adaptable to engineering problems, more advanced models were acquired to solve more complicated problems.

Reservoir study . . . In research problems the machine computer finds application in the solution of differential equations not soluble by analtyical methods and where a numerical approach, without the facilities of the high-speed machine, would be impracticable. An example of this was the calculation of unsteady-state gas flow through porous media which leads to a second-order nonlinear partial differential equations for which no analytical solution was found. A stable numerical procedure was developed by Humble engineers for solving the equation for production of gas at constant rate from linear and radial systems. In this solution, the electronic computer was used to perform the numerical integration using an implicit form of an approximating difference equation. Similar work has been followed to a lesser degree in the study of waterflood projects.



Up to 40 mass numbers may be preselected and programed by the Spectro-Sadic—peaks may be in the range of either mass 40 through 150 or from 12 through 122—and once adjusted, the instrument system is completely automatic.

Digital conversion is accurate to 1 part in 1,000, full-scale, equivalent to reading the usual graphical record to one-tenth of a division. Conventional records of the specific peaks programed by the Spectro-Sadic may be obtained simultaneously with the digital readout, if desired, or a record of the complete spectrum may be taken by simply switching from one system to the other. Two units have been installed to date, the first at the Paulsboro, N. J., refinery of Socony-Vacuum Oil Co., Inc., and the other at the Bayway, N. J., refinery of Esso Standard Oil Co.

NATIONAL CASH REGISTER CO. . . .

The new business machines of N.C.R. are being applied in many operational divisions of the petroleum industry. For example, National's new 142 payroll and distribution machine has an automatic tax computer, which automatically indicates withholding tax, Social Security, local taxes, or other variable deductions based on a percentage of gross earnings. As many as 28 totals for payroll writing and 50 totals for labor distribution are available on this latest of all payroll equipment.

Pay check or pay envelop, pay statement, employe's earn-

Gas injection . . . In operational problems, the study of closed reservoirs wherein the oil is displaced by its contained gas has been made with the aid of the machines. By being able to predict field conditions and the gas-oil-ratio changes, a complete gas-injection program may be set up well in advance, with all economic factors being included in such a study. The eventual design of a gas-injection system readily can be completed on the basis of machine calculations.

Another operational problem which can be constantly handled by the electronic computer is vapor-liquid equilibrium calculations in multistage field separators. Each producing lease will have its own individual condition; i.e. it will be producing oil or condensate of varying gravities and its gas production may be for fuel purposes (dry) or for gasoline-plant processing (wet). The typical problem may be set up on a control panel, and a computation rapidly made for an individual lease.

Refining use . . . Its use in vapor-liquid equilibrium calculations brings to mind its possibilities in refining operations. The machine calculator at Humble's Baytown refinery, as in the production department, is being used to an increasing extent in the solution of repetitious and time-consuming problems.

In routine work, the computer is used for mass-spectrometer analysis, where calculations require the solution of series of simultaneous equations. In distillation calculations, standard setups are made on control problems, either for a general problem or for a plate-to-plate study. Volatilities and components to fit individual problems are then inserted and the required calculations made automatically. Minimum reflux rate problems may be handled rapidly in this way.

Naphtha fractionation . . . As plant services change through the years, new evaluations of existing equipment must be undertaken to afford maximum utilization in long-term service. Complex mathematical processes are required in most of these and a current problem at Baytown involves naphtha fractionation towers. Many complicating factors, such as the number of components involved and the difficulty of achieving sharp separation, make the electronic computers invaluable.

Pilot-plant runs involving various catalytic feed stocks are being made at Baytown and evaluation of results is made on the computer. On the basis of data collected, yields and quality of products are calculated rapidly, providing the department with results far sooner than previously. The work involves the conversion of orifice-meter readings to volumetric quantities and by use of a standard control setup, these may be arrived at in short order.

Other uses for the machine include statistical studies by the research department where the correlation of a large mass of data must be made as in the case of alkylation studies. Further application can be expected in making economic studies and plant balances where widely diversified products and varying types of crude being run make such investigations greatly complicated.

These uses, actual and potential of the electronic computers, represent but a fraction of the possibilities within the scope of the machines. As various types of problems are handled, they open the way to the solution of more complicated ones.

ings record, payroll journal, and check register are all created in a single operation. Gross and net pay are automatically computed by the machine, and up-to-date balances for earnings, withholding tax, FIC, and any other one deduction are figured and printed by machine on each employe's earnings record.

The depression of a single key causes instant, simultaneous printing on all five records, all of which appear in original print; no carbon is used.

Daily payroll accrual and the distribution of labor are accomplished in one operation, directly from clock cards or other original records. This newest payroll machine is already in extensive use throughout industry.

INTERNATIONAL BUSINESS MACHINES CORP. . . .

The petroleum industry is presently using some 200 high-speed computers of varying types and capacities manufactured by I.B.M. Of these, approximately a score of I.B.M. card-programed electronic calculators are being used in the solution of engineering problems of vital importance to the industry.

It is interesting to note that these card-programed calculators all have been installed by leading oil companies within the past year, underscoring the industry's determination to solve its engineering problems as swiftly and economically as possible by means of mathematical computation.

Through the use of the card-programed calculators the industry as a whole already has made great progress in solving problems occurring in the fields of reservoir mechanics, engineering and geological data handling, research experiments, production engineering, and refinery engineering. Photo shows I.B.M. card-programed calculator installed at Socony-Vacuum Oil Co., Inc.'s Paulsboro, N. J., research and development laboratories.

Characteristics of the I.B.M. card-programed electronic calculator is its ability to solve problems involving any number of steps to obtain a single solution. Its unit, three of which are standard I.B.M. machines, include an electronic calculating unit capable of 2,174 additions and subtractions or 86 multiplications and divisions a second; an accounting machine for interpreting instructions and for accumulating and printing results; a storage unit for retaining data for later use in a problem and a punching unit for recording results in I.B.M. cards.

Hundreds of other I.B.M. punched-card machines are used for engineering and research activities as well as all phases of accounting operations in the production, refining, pipe-line, marketing, and home-office divisions of the oil industry.

FELT & TARRANT MANUFACTURING CO. . . .

When it comes to turning out figure work fast, the petroleum industry depends in no small measure upon versatile Comptometer adding-calculating machines. One leading Tulsa petroleum company compiled a list of the different types of figure work handled by its Comptometer department. The total came to 40 and included such diversified work as checking accounts-payable invoices, extensions on truck time tickets, computing partnership statements, production expense statements, figuring gas time sheets, adding auto-mileage sheets, etc.

One means of handling figure work that is growing in popularity is represented by the Comptometer—Peg-Board method shown in illustrations (Phillips Petroleum Co.). In the Peg-Board routine, forms on which distribution figures have been entered are shingled across the metal peg strip so that only the columns which carry items of like classification to be added, are visible. By crossadding, the items of like classification are quickly and easily totaled. In like manner, by rearranging and reshingling the forms to expose a different set of items, many different breakdowns and classifications of information are readily obtained.

The latest Comptometer adding-calculating machine is the Model 992 electric made in 8, 10, and 12-column sizes. The current nonelectric Comptometer is the 3D11 model.

REMINGTON RAND INC. . . .

The many complicated problems involved in oil exploration, production, and research plus numerous accounting applications lend themselves to the high-speed and accurate performance of Univac, Remington Rand's electronic computing system. Basis of the Univac Factronic System is a memory consisting of a mercury delay line and a metallic tape system 1,500 ft. long containing 1,440,000 characters or digits in a magnetic code. The metallic tapes are sensed and recorded by Univac at the rate of 10,000 characters a second.

An example of the application of Univac for oil-exploration purposes is shown in its computation of depths of strata for seismic reflection recordings. The time required for Univac to compute one value of the equation is approximately ¼ second. If there are 2,000 values to be computed, the entire process would take less than 10 minutes of computer time.

Another instance of Univac's high-speed computation is an actual vertical gradient problem performed for one oil-exploration company. By using a prescribed approximation formula, a vertical gradient map was computed on the Univac in less than 3 minutes.

Univac is part of a complete line of modern business machines and methods especially designed by Remington Rand Inc. for industry. Its line of punched-card equipment is especially useful in many phases of the oil and gas industry. The company's up-to-date accounting, adding and calculating machines, and record-keeping devices are particularly valuable wherever office work is performed.

TELEPLOTTER

TELECORDEX

TELEREADER

TELECOMPUTING CORP. . . .

Telecomputing instruments deal in data—the automatic analysis of vast amounts of data. Actually, they also deal in time—hours and minutes, week and days, even years, as that is the time they give engineers and scientists by analyzing data far faster than is possible manually. Time formerly spent in lengthy manual analysis is now time saved, and the time of engineers and scientists can be more productive than even before.

Teleplotter . . . This new business machine automatically plots graphs 10 times faster than by hand. This tremendously assists in the problem developed in modern engineering—the problem of manual plotting. Frequently, thousands of points must be plotted to reach a single solution.

The slowness and human errors of manual plotting cause serious delays, added overhead, and expense. Plotting bottlenecks can now be broken by a business machine. The unit has a plotting speed of 40 points per minute.

Telecordex . . . Operating at electronic speeds, Telecordex counts and stores a sequence of electrical pulses from any of a variety of sources. It both adds and subtracts. In addition, it prints a tabular record and simultaneously operates an I.B.M. summary punch to provide punched cards for further analysis.

Telereader . . . The Telereader begins the work that is finished by the Teleplotter. It is the first link in Telecomputing's chain of time-saving instruments. It measures distances on oscillographic and other graphical records. Data that would take hours to measure manually is measured in minutes, and more accurately. The Telecordex then accumulates the data measured by Telereader and either prints a record of it or relays it to I.B.M. equipment—or both. Telecordex also can relay data to I.B.M. punch and calculating equipment (for transmittal to the Teleplotter).

Two sections of the new electronic computer installation at headquarters of Seeligson Engineering Committee, on eighth floor of Transit Tower Building, San Antonio. The committee collects all factual operating data for one of the world's most complicated oil fields. Seeligson field has some 750 different producing wells, 59 separate reservoirs, and 42,000 bbl. daily oil production.

A Petroleum-Engineering File . . . *on punched cards*

Mechanization has resulted in more efficient utilization of engineers' time and has eliminated countless hours of tedious clerical detail

by R. K. Guthrie

With J. W. Amyx, A. M. Moore, W. M. Robinson, L. Kotara, and R. H. Wallace

DURING the past 20 years, great strides have been made in the application of technical methods to the exploitation of oil and gas reserves. The physical laws governing the accumulation and production of oil and gas have been defined through research. New and improved instruments have been designed to measure and study the physical properties of both hydrocarbons and the associated reservoir materials. However, relatively little improvement has been made to the routine and clerical methods used to process petroleum-engineering data.

As a result, the petroleum engineer today often finds himself overwhelmed with a flood of information which has been collected and measured through the use of new methods and new instruments. His textbooks and technical journals bulge with formulas in which these data may be applied. Yet the only tools most engineers have to process these data and to make their calculations are a pencil, paper, typewriter, slide rule, and desk calculator—the same tools they had 20 years ago.

It is the purpose of this paper to outline a plan and summarize the progress made using punched cards for the mechanization of most of the routine and clerical work associated with the processing of petroleum engineering data.

Authors are with Seeligson Engineering Committee, San Antonio. Paper presented at Fifth Annual Oil Recovery Conference (Texas Petroleum Research Committee), held at A. & M. College of Texas.

New Data-Processing Procedures

Punched-card methods . . . The first prerequisites for applying these methods to petroleum-engineering work are that sufficient engineering problems and their associated data processing be centralized in one location, and that a punched-card system be available for engineering use at least part of the time.

After these two prerequisites have been fulfilled, the first step in applying punched-card methods to any data-handling problem is to organize the data handling into a well-defined procedure. Fig. 1 shows a procedure which has been designed for handling most of the basic data required in petroleum-engineering calculations.

The procedure was originally designed as a manual data-processing procedure for information collected during the development and operation of a large multizone oil and gas field, and it is this procedure which is now being mechanized.

The top row of items in Fig. 1 includes the greater portion of the basic measurements, either from the field or laboratory, on which petroleum engineering calculations are based. To date, oil and gas production data, well tests, drill-stem tests, electric log interpretations and routine core-analysis data have been successfully punched into cards. Plans also have been made for punching bottom-hole pressures, well-completion and workover summaries, core descriptions, and special core-analysis data, such as restored-state measurements.

The various intermediate processing steps necessary to prepare the basic data for reservoir calculations are outlined in the body of Fig. 1. Many of these intermediate steps have been designed to furnish statistical and graphical histories and the averaged or summarized information required for routine and special reports for management and operating personnel.

No attempt has been made to outline procedures for reservoir calculations, but other articles in this issue indicate that many reservoir problems

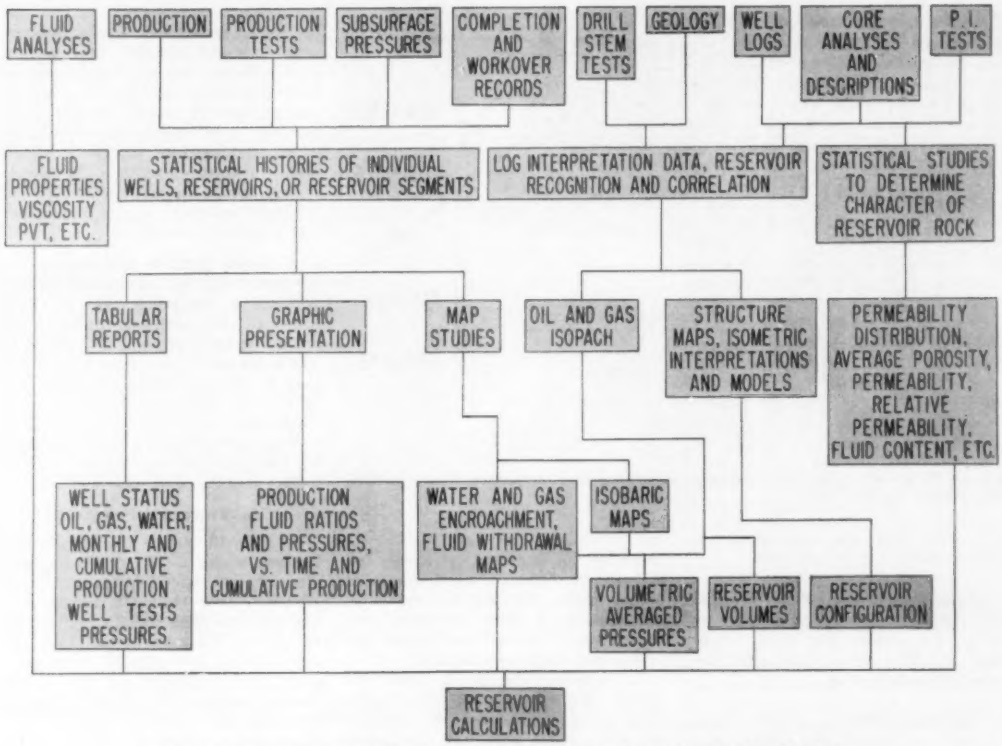

FLUID ANALYSES
PRODUCTION
PRODUCTION TESTS
SUBSURFACE PRESSURES
COMPLETION AND WORKOVER RECORDS
DRILL STEM TESTS
GEOLOGY
WELL LOGS
CORE ANALYSES AND DESCRIPTIONS
P.I. TESTS
FLUID PROPERTIES VISCOSITY PVT, ETC.
STATISTICAL HISTORIES OF INDIVIDUAL WELLS, RESERVOIRS, OR RESERVOIR SEGMENTS
LOG INTERPRETATION DATA, RESERVOIR RECOGNITION AND CORRELATION
STATISTICAL STUDIES TO DETERMINE CHARACTER OF RESERVOIR ROCK
TABULAR REPORTS
GRAPHIC PRESENTATION
MAP STUDIES
OIL AND GAS ISOPACH
STRUCTURE MAPS, ISOMETRIC INTERPRETATIONS AND MODELS
PERMEABILITY DISTRIBUTION, AVERAGE POROSITY, PERMEABILITY, RELATIVE PERMEABILITY, FLUID CONTENT, ETC.
WELL STATUS OIL, GAS, WATER, MONTHLY AND CUMULATIVE PRODUCTION WELL TESTS PRESSURES
PRODUCTION FLUID RATIOS AND PRESSURES, VS. TIME AND CUMULATIVE PRODUCTION
WATER AND GAS ENCROACHMENT, FLUID WITHDRAWAL MAPS
ISOBARIC MAPS
VOLUMETRIC AVERAGED PRESSURES
RESERVOIR VOLUMES
RESERVOIR CONFIGURATION
RESERVOIR CALCULATIONS

Fig. 1—Seeligson Engineering Committee's processing procedure for petroleum engineering data.

are adaptable to mechanized computing processes on machines similar to the ones used for the data-processing described herein. It is very likely that once all the parameters used in reservoir calculations are defined in the detail permitted by a punched-card processing procedure, the reservoir engineer will be able to achieve more accurate predictions and apply new methods heretofore not feasible.

Transferring Information Into Cards

Some very excellent material on the organization and planning of a machine accounting department can be obtained from the manufacturers of punched-card machines, and much of that material can be applied to the machine processing of petroleum-engineering data.

There are a few items worthy of mention here, however, as being of particular importance:

1. Control of source documents . . . Time will be saved and mistakes prevented if source records can be set up on forms which contain the data in a sequence convenient for the key-punch operator.

2. Punching sequence . . . This should always follow sequence of source document. If this is not the sequence required for the punch card file, then the cards should be punched in an in-

1. CONTROL OF SOURCE DOCUMENTS IS ADVANTAGEOUS.
2. PUNCHING SEQUENCE SHOULD FOLLOW SEQUENCE OF INFORMATION IN SOURCE DOCUMENTS.
3. STANDARDIZE ABBREVIATIONS, REMARKS, AND FOOTNOTES.
4. MANUAL OPERATIONS SHOULD BE FEW AND SIMPLE.
5. CODING.

Fig. 2—Recommendations as to mechanics of transfer of engineering information to punch cards.

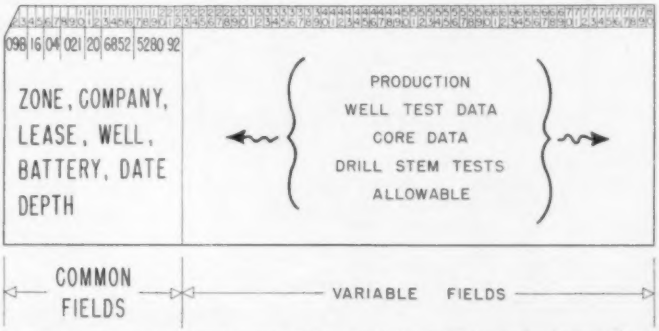


Fig. 3—Example of punch-card layout design. In business-machine nomenclature, "fields" means number of punch-card columns devoted to one subject.

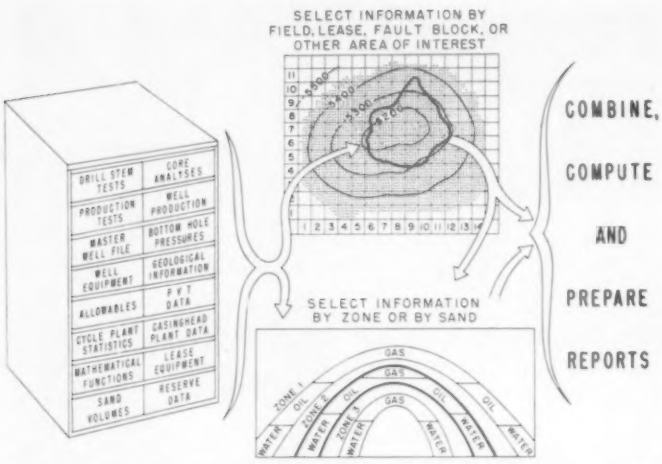


Fig. 4—This is a flow chart of how petroleum engineering files can be handled on a punched-card, business-machine basis.

termediate form and reproduced into the standard form by machine.

3. Standardize abbreviations, remarks, and footnotes . . . These were the things that caused the most trouble when punching core analyses, drill stem tests, production tests.

4. Manual operations . . . These should be few and simple. In setting up a data-processing system, all manual operations should be scanned frequently and analyzed carefully to see if they are adaptable to machine methods.

One of the early mistakes made in the procedure described herein was manually to post well elevations on each source document which contained actual depths requiring conversion to subsea depths. The elevation was punched into each detail card and subsea depths machine computed.

An improved practice is to have elevations in the master well cards. Machine procedures are used to select the correct elevation for a well, the depths are converted to subsea and the master well cards returned to the file to be used again. Several hundred thousand depths have been converted to subsea in this manner.

5. Coding . . . Number coding has been used to replace alphabetic information for two purposes—one, to save card columns when a lengthy alphabetic remark can be reduced to a code number, and the other to simplify control and card arrangement problems when working with alphabetic fields, such as company and lease. Alphabetic coding should be avoided unless the machines have been equipped with special circuits to handle it.

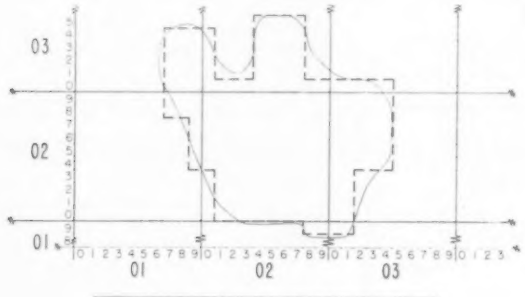
6. Common fields in card design . . . All card-design manuals discuss the importance of designing card-punching forms so that common control fields are in the same position in each deck. The fields which have been made common in all card decks are illustrated in Fig. 3. They are the fields upon which most merging, sorting, and controlling operations are based—company, lease, well number, producing zone, battery number, date, and depth.

Card Processing Precedures

An over-all outline of card-processing procedures is illustrated diagrammatically in Fig. 4. The decks of cards containing the necessary source data are removed from the file. By use of the sorting and collating machines, the desired cards are selected from these decks, then combined and arranged in the required order. Any necessary computations are performed and the finished data is printed by the tabulating machine. The cards are then returned to their proper place in the file, ready for the next problem.

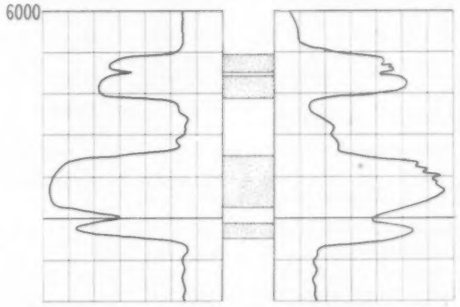
Each card-processing procedure, if

(Continued on page 77)



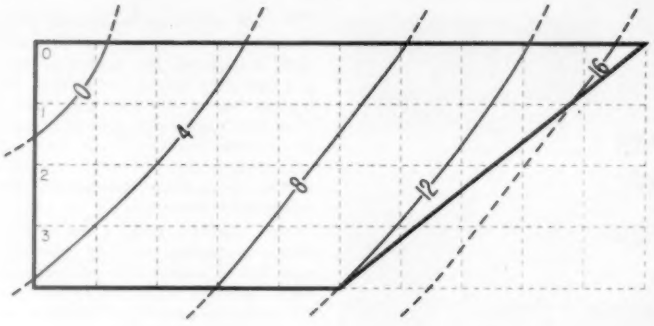
"Y" AXIS LIMITING COORDINATES	"X" AXIS LIMITING COORDINATES	
	FIRST	SECOND
018 - 020	027 - 032	
019 - 024	020 - 032	
023 - 028	018 - 035	
027 - 031	016 - 035	
030 - 035	016 - 021	023 - 028
034 - 036	023 - 028	

Fig. 5—Method of selecting within coordinate boundaries, using a business-machine punch-card "collator."



WELL IDENTIFICATION	ZONE	TOP	BASE	INTERVAL NUMBER
08 16 87	12	6011	6015	1
		6016	6022	2
		6035	6048	3
		6051	6054	4X

Fig. 6—Electric-log data can be put on punch cards.



0	3	9							.5
	00.7	01.0	03.0	04.7	06.0	07.5	09.5	11.3	14.0	16.1
	.8							.9	4	
1	01.0	02.5	04.2	05.6	07.0	09.0	10.8	12.7	14.5	
	2						.8	.3		
2	02.5	04.0	05.3	06.7	08.5	10.3	12.0	13.5		
	3					.7	.1			
3	04.1	05.2	06.5	08.1	10.1	11.4	12.6			

Fig. 1—Seeligson Engineering Committee lays a transparent grid of numbered rectangles over the isopach map to be "worked." The isopachic data are then transferred, eventually to punch cards.

Computation of Sand Volumes From Isopach Maps . . .

Using punched cards instead of a planimeter

by R. K. Guthrie
With J. W. Amyx, R. H. Wallace, and W. M. Robinson

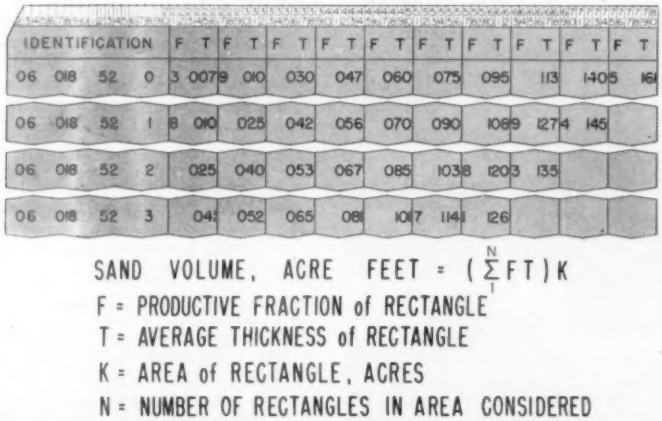

IDENTIFICATION F T F T F T F T F T F T F T F T F T F T
06 018 52 0 3 007 9 010 030 047 060 075 095 113 1405 16
06 018 52 1 8 010 025 042 056 070 090 1089 1274 145
06 018 52 2 025 040 053 067 085 1038 1203 135
06 018 52 3 045 052 065 08 1047 1143 126
SAND VOLUME, ACRE FEET = $(\sum_{1}^{N} FT)K$
F = PRODUCTIVE FRACTION of RECTANGLE
T = AVERAGE THICKNESS of RECTANGLE
K = AREA of RECTANGLE, ACRES
N = NUMBER OF RECTANGLES IN AREA CONSIDERED

Fig. 2—Here is a business machine punch card, with isopachic data it will contain after punching.

MOST petroleum engineers have had occasion to use a planimeter and are familiar with the difficulties encountered with that instrument when determining sand volumes from isopach maps. These difficulties are due to instrument errors, lack of operator skill, and the shrinkage or stretch of paper copies of a map.

Although not a serious handicap for most engineering calculations, these limitations often become serious when computing participation in gas and oil unitization contracts or other applications where small percentage differences have a considerable significance. The ability to reproduce results to small tolerances and maintain a visible record of all interpretations and measurements becomes desirable in these applications.

It is the purpose of this paper to outline a plan, using punched cards, by which all the computations necessary for the determination of sand volumes are mechanized, and, at the same time, the difficulties associated with planimeter methods are eliminated.

Description of Procedure

The method used is elementary and is illustrated in Fig. 1. A transparent grid of numbered rectangles, uniform in size, is superimposed upon an isopach map and the average sand thickness for each rectangle recorded within that rectangle. If the rectangle is only partially productive, then the productive fraction is recorded, together with the average thickness for that fraction.

The transparent overlay is removed, a blueline paper copy is reproduced from it, and the copy turned over to a keypunch operator. The top part of Fig. 2 represents the four cards which would be punched from the map overlay of Fig. 1. In the portion of the card marked "identification," coded numbers are shown, identifying the company, lease, producing zone, interpreter, and the map. After the cards are punched and verified, they are processed through a calculating punch machine which computes the following and punches the answer in a "trailer," or summary card:

Sand volume in acre-feet $= (\sum_{1}^{N} FT)K$
where

F = productive fraction of the rectangle
T = average thickness of rectangle, feet
K = area of rectangle, acres
N = number of rectangles in area considered

K, the area of the unit rectangle, is determined by dividing a known acre-

(Continued on page 78)

Authors are with Seeligson Engineering Committee. Paper presented at T.P.R.C.-Texas A. & M. meeting.

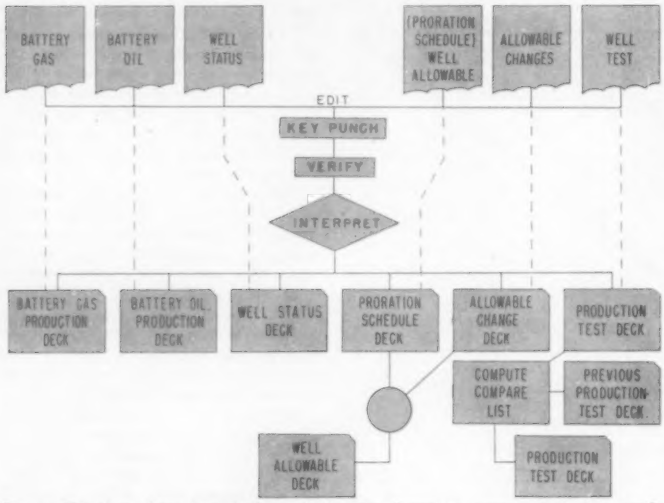


Fig. 1—This chart shows how Seeligson Engineering Committee prepares basic-data punch-card decks for production allocation.

Allocating Battery Oil and Gas Production to Individual Wells...

Using punched-card computing system

by J. W. Amyx

With R. K. Guthrie, W. M. Robinson, A. M. Moore, Raymond Martinez, and J. R. Tower

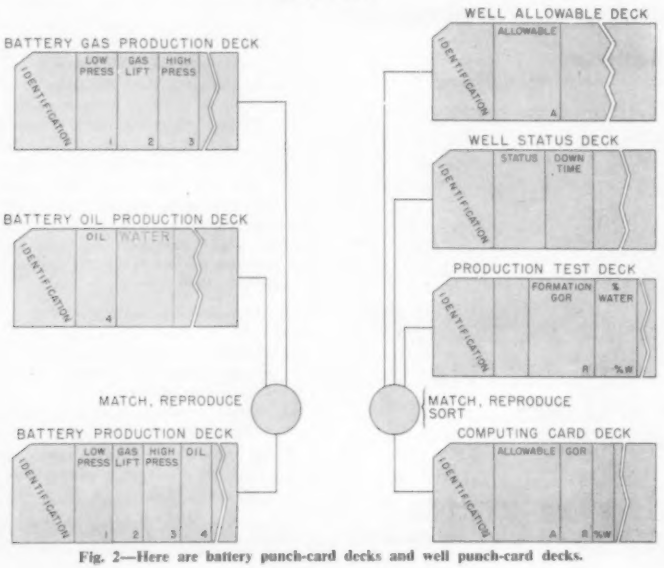


Fig. 2—Here are battery punch-card decks and well punch-card decks.

IN many petroleum engineering problems, the production from individual wells is required. The general practice is to produce several wells from one horizon into a common tank battery from which battery production is gaged or metered; therefore, it is necessary to determine the individual well production from battery-production data and well-test data.

The objective, then, is to allocate battery-production data to individual wells and to prepare a file of individual well-production data satisfactory for use in the preparation of statistical reports and reservoir computations.

The punched-card computing system presented in this report is programed for accomplishing this objective. The method of allocation used is based upon well allowables; however, the computing system may be readily adapted to other methods as well.

Source of Records and Data

In the particular example chosen for demonstrating a punched-card computing procedure, oil production is gaged by battery, gas production metered by battery, and water production determined from production tests of individual wells.

The separate summaries, by battery, of oil and gas production data are obtained monthly. Production tests are made on each producing well each month and are reported on GO-2 or similar forms. In addition, a routine well-status report which reflects the producing method, status, and down time of each well is obtained each month.

These data, together with the effective proration schedule and monthly reports of change of allowables, constitute the basic data for the allocation of production to individual wells. They are punched into cards and become part of the permanent field file. (See accompanying paper describing a petroleum engineering file on punched cards.)

The basic data of the source documents described above may be obtained from the field measurements either by manual methods or by other punched-card procedures (see articles by Spinning and Buchanan).

Method of Allocation

Each well is considered to contribute to the oil production of the battery in proportion to its fraction of the total

Authors with Seeligson Engineering Committee, San Antonio. Paper from fifth annual recovery conference, T.P.R.C., Texas A. & M. meeting.

allowable of that battery. In equation form:

$$\text{Well Oil} = \text{Well Allowable} \times \frac{\text{Battery Oil}}{\text{Battery Allowable}}$$

where "Battery Allowable" is simply the sum of the individual allowables of the wells constituting that battery.

Therefore:

$$\text{Well Oil} = \text{Well Allowable} \times \frac{\text{Battery Oil}}{\Sigma \text{ Well Allowables}}$$

or

$$= (A) \times (F_o)$$

where:

$$F_o = \frac{\text{Battery Oil}}{\Sigma \text{ Well Allowable}} = \text{Battery Oil Factor}$$

$$A = \text{Well Allowable}$$

Also, each well is considered to contribute to the gas production of the battery in proportion to the ratio of the gas production indicated by tests to the sum of the indicated gas production of the wells which constitute that battery. Indicated gas production for a well is defined as the product of its oil production, as obtained above, and the gas-oil ratio of that well. In equation form:

$$\text{Well Gas} = \text{Well Oil} \times \text{G.O.R.} \times \frac{\text{Battery Gas}}{\Sigma (\text{Well Oil} \times \text{G.O.R.})}$$

or using the terminology introduced before:

$$\text{Well Gas} = (AF_o) \times R \times \frac{\text{Battery Gas}}{\Sigma (AF_o \times R)}$$

$$= (A \times R) \times \frac{\text{Battery Gas}}{\Sigma (A \times R)}$$

$$= (AR) \times (F_g)$$

where:

R = G.O.R.

$$F_g = \frac{\text{Battery Gas}}{\Sigma (A \times R)} = \text{Battery Gas Factor}$$

Water production is computed in this example from the well oil production and the per cent water in the total fluid as calculated from the production test. If water production is metered by battery, it can be allocated in a similar manner to that used for gas.

The equation as used herein is:

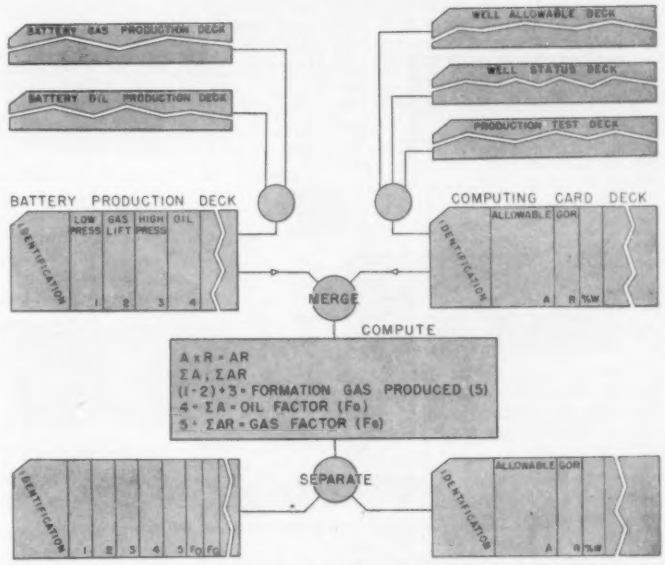


Fig. 3—Layout of continuation of punch-card calculations followed by Seeligson Engineering Committee.

$$\text{Well Water} = (AF_o) \times \frac{\text{Per Cent Water}}{(100 - \text{Per Cent Water})}$$

Preparing Source Data "Decks"

In the paper describing a petroleum engineering file on punched cards also presented here, the advantages of designing card forms for ease of punching and for integration into the over-all machine program are discussed.

The card forms used in preparation of basic data for the production allocations described in this report were designed to fit an over-all program. Also the source documents, from which the basic data are transcribed to punched cards, are edited by a trained

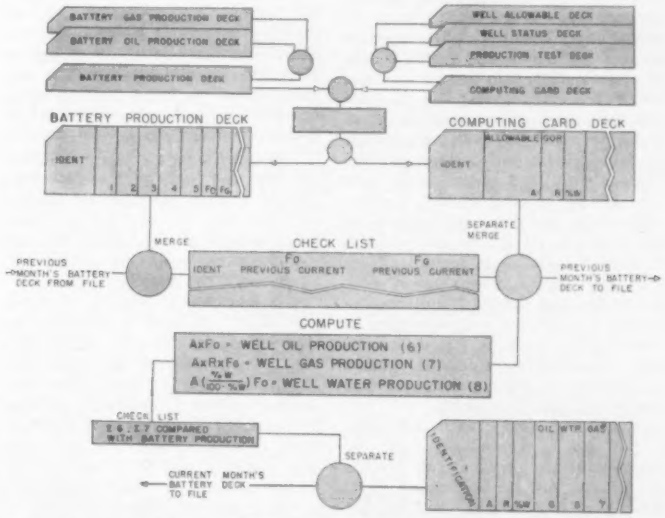


Fig. 4—Layout of further continuation of punch-card calculations followed by Seeligson Engineering Committee.

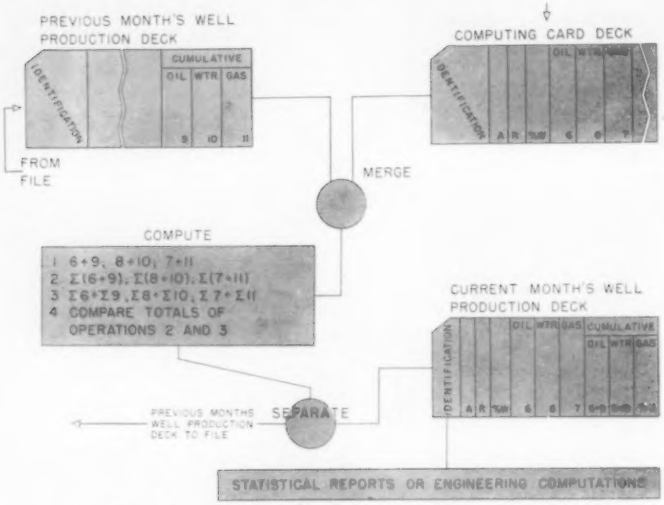


Fig. 5—Layout of another step of the punch-card calculations.

production clerk to standardize abbreviations and remarks. Additional manual operations required in the preparation of the source documents are also accomplished at this time.

Five card decks, prepared from six sources of data, contain the basic information from which the allocations and computations are made (see Fig. 1).

Two of these decks are as follows:

1. The bat ery gas-production deck is prepared from a monthly gas-production report in which gathered gas volumes in thousands of cubic feet are reported by battery. Gas-lift injection volumes metered at the gas-lift station associated with that battery are also included in this report. The data are punched into and verified in cards which were designed to fit the sequence of data in the report as received. The cards contain: (a) identification data (i.e., company, lease, battery, producing horizon, and date); (b) low-pressure gas gathered; (c) gas-lift gas injected; (d) high-pressure gas gathered.

2. The battery oil-production deck is punched and verified from a monthly report of battery oil production, in barrels. The cards in this deck contain: (a) identification data; (b) battery oil production. Water-production data can be included, if available.

Three other decks, each containing a card for each producing well (or completion) are prepared for the file as follows: (a) the well-status deck, (b) the allowable deck, and (c) the production-test deck.

The well-status deck is punched and verified from a routine monthly report which reflects well status, producing method, and down time. This report lists the wells by battery and is used to check the battery identification for wells. This deck contains: (a) identification (company, lease, well, battery, producing horizon, and date); (b) well status (such as shut in, allowable transferred, dead; (c) down time (the number of days during the month the well was off production); and (d) flow string.

The allowable deck is prepared from two sources of information: (1) the effective proration schedule for the period and (2) reports of change of allowable during the period. The data punched into the cards include identification, effective dates, scheduled allowable, and remarks.

The cards from the proration schedule form the basic deck. Cards from change of allowable data are inserted into the deck to pick up new wells or to replace or supplement the proration schedule card with revised data on old wells (see Fig. 1).

The proration schedule is published periodically. A card is punched for each well on the schedule, and, in addition, a card for each lease and field shown on the schedule. The data punched include the following: (a) identification, (b) G.O.R. (if any), (c) transferred or adjusted allowable, (d) scheduled allowable, and (e) proration commission classifications and remarks (i.e., marginal, limited production, etc.).

When the data have been punched and verified, the cards are processed through the tabulating machine in which the transferred and adjusted allowables are compared for zero balance. At the same time, the scheduled allowables are totaled and are compared to the lease and field total values obtained from the schedule. If a zero balance is obtained for both comparisons, then the new deck is compared by means of the collator to the old allowable deck to determine if cards are available for all wells which had previously been carried on the schedule. If a well which has been producing does not appear on the new schedule, the status of that well is checked.

The basic allowable deck is complete when the above checks are accomplished and any errors which were disclosed rectified.

Reports of change in allowable are reviewed as they are received, and in the case of wells having more than one allowable effective during the month, the duration of each allowable period is posted to the change of allowable report by the clerk who reviews and routes data to the key punch section. In addition, this clerk indicates the standard coding to be used to represent the remarks from the report. The reports of change in allowable are accumulated and are punched into cards after the first of each month. Then the allowable change cards are inserted into the proration schedule deck to make a complete allowable deck applicable to the month of interest.

The production-test deck is prepared from a monthly report of production tests. This data is reported on Railroad Commission GO-2 or similar forms. A card for each well-production test is prepared to include: (a) identification; (b) producing method; (c) duration of test; (d) oil, gas, and water production during the test; (e) formation gas-oil ratio; (f) surface pressures; (g) choke size; (h) trap pressure; (i) allowable which was effective at the time of test. A second card is prepared, when necessary, to include remarks and other pertinent data which cannot be included in the first card.

To prepare the production test deck for the file, the calculating punch is used to compute per cent water and gas-oil ratio from the gas and oil production reported.

The current month's production test deck is then compared to the previous month's to ascertain if the water per cent and gas-oil ratio for each well in the current production test deck are representative. This can be accomplished, in part, in the computing oper-

ation indicated above by merging the previous month's production test deck with the current month's and comparing the gas-oil ratios and water percentages. If the difference in these factors does not fall within specified confidence limits, then an identifying code can be punched into the current month's card. This card can then be pulled from the deck and compared with other data on that well to determine representative values to be used in the production allocation.

Selection and Transfer of Correct Data Into Computing Cards

To facilitate the computation of individual well-production data, the basic data pertinent to the calculations are selected and transferred by machine from the five source-data decks to two decks—one deck for battery data and one for individual well data (see Fig. 2).

In the case of the battery data, the desired card deck for the file and for production allocation is a battery production deck which contains both oil and gas data and, where available, water data. The gas and oil data were punched into separate decks to facilitate punching and verification. To prepare a battery production deck, the battery gas-production deck and the battery oil-production deck are compared or "matched" on the collator. This operation is to ascertain if there is a card in each deck for each battery represented in either deck. The oil-production data are then reproduced from the battery oil-production deck into the battery gas-production deck. A reproducing punch performs this operation. The battery gas-production deck thus has become our battery production deck containing the reported basic data.

The individual well data required for the allocation of production are: (1) allowable; (2) down time; (3) formation gas-oil ratio; (4) water cut, either expressed as per cent of total or as water-oil ratio.

These data are contained in three card decks (Fig. 2) and are selected and transferred to a computing card deck by machines.

First, the well status deck is duplicated, in part, by means of the reproducing punch. The duplicate well-status deck—now considered the computing card deck—is then matched with the allowable deck to ascertain if each well in each deck is represented by a card in each deck. For those wells having changes in allowable and/or down time during the month of interest an adjusted allowable is computed by machine and punched into the computing card deck. The allowables of wells without down time or change in allowable during the month are reproduced into the computing card deck.

The computing card deck containing identification data and allowable for each well is matched with the production-test deck and the formation gas-oil ratio and the water, per cent of total fluid, are reproduced into the computing cards from the production-test deck.

The computing-card deck, which has been kept in company, lease, and well order for the matching and reproducing operations is then sorted to arrange the cards in battery groups.

These operations result, therefore, in concentrating the basic data into two card decks: (1) the battery production deck, consisting of a card for each battery and containing oil and gas-production data; and, (2) the computing card deck, consisting of a card for each well and containing allowable, gas-oil ratio, and water cut.

Computation of Battery Factors

The next procedure is the calculation by machine of the oil and gas factors for each battery.

As shown in the section on method of allocation, individual-well oil production equals the product of the well allowable and the oil factor (F_o); the individual-well gas production equals the product of the well allowable, well gas-oil ratio, and the gas factor (F_g).

The results of these calculations are punched into the battery card which has thus gained three new fields of data: (1) the formation gas produced; (2) the oil factor; (3) the gas factor (see Fig. 3).

To accomplish this, the battery production deck is merged with the computing card deck (Fig. 3) so that the well cards from the computing card deck are arranged in well sequence in front of the battery card representing the battery to which those wells are connected. The resulting merged deck is then passed through the calculating punch. The allowable and gas-oil ratio are read from the individual well cards. The product of the allowable and gas-oil ratio is obtained and accumulated by cumulative multiplication so that the sum (ΣAR) of the individual products of allowable and gas-oil ratio is obtained from the battery. The well allowables are accumulated to yield the sum ΣA of the well allowables for the battery.

From the battery card, following the well cards of that battery, the gas volumes produced from the low stage and high stage of separation are read and summed. The gas-lift injected volume is read and subtracted from the sum of the above to yield formation gas produced for the battery. The formation gas produced is then divided by the ΣAR to yield the battery gas factor (F_g). The oil production for the battery is read from the battery card and is divided by ΣA to yield the battery oil factor (F_o).

The newly computed battery cards are merged and compared with similar cards for the previous month. The tabulating machine is used to selectively list data for batteries which show changes, exceeding specified limits in oil or gas factors. An engineer or trained production clerk scans this list and makes corrections or additional interpretations as required.

Additional factors which in some applications of this general procedure might be desirable are a water factor and a gas-lift factor when the battery data are available and it is desired to allocate battery water and gas-lift data to individual wells. These factors can be calculated by the above-described methods by minor modifications to the control panels of the machines and in card-handling procedures.

Allocation of Production to Individual Wells

To calculate the well-production data, the battery production deck is again merged (Fig. 4) with the computing card deck with the battery card ahead of the well cards of that battery so that the battery factors are available in the machine when each well card appears. The merged decks are passed through the calculating punch (Fig. 4) where the following computations are made and the results punched into each well card:

1. Well allowable (A) times oil factor (F_o) to yield individual well oil production.

2. Well allowable (A) times gas-oil ratio (R) times gas factor (F_g) to yield individual well gas production.

3. Individual well oil production (AF_o) times per cent water divided by 100 minus per cent water to yield individual well-water production.

To further verify the results of the calculations, the merged deck is passed through the tabulator, and the sum by battery of the oil and gas production data for the individual wells is compared to the oil and gas production data from the card representing the battery to which those wells are con-

(Continued on page 78)

SHELL PIPE LINE CORPORATION 19

CODES	PIPE LINE No.	LEASE No.	DATE MO.	DATE DAY	TICKET NO.	CORR. 60°GVTY.
		1149111	12	11	245	

CHECK BY CALC.	BARRELS
	453.43

DISTRICT TXL Ellen.
OWNER Shell Oil
LEASE NAME TXL "K" Wells 1-4

TANK NO.	TANK SIZE	IND. GRAVITY	IND. TEMP.
396	500	40.5	80

%B.S. & W.	TANK TEMP.		FEET	INCHES	CACULATED BARRELS	
1/10	78					
		1ST. MEAS.	15	6	508	21
		2ND. MEAS.	1	6	50	25
			453.43		457	96

Chart No. 1.

INCREMENT FACTOR

Pool or Field TXL Ellenb'gr.
Owner Shell Oil Co.
Lease TXL "K" Wells 1-4
Tank No. 396 Hgt. 16'
Location Code 1149111 Capacity

INCR'MT. NO.	INCR'MT. FCTR.	VERTICAL COMPONENT FROM	VERTICAL COMPONENT TO
1	.69786	0	3'1½"
2	.68769	3'1¾"	6'2½"
3	.68432	6'2¾"	9'4½"
4	.67578	9'4¾"	12'7¾"
5	.67379	12'8"	16'0"

Chart No. 2.

Calculation of Crude-Oil Run Tickets . . . By Electronics

by H. M. Spinning*

THE use of punch-card equipment for oil accounting is not new. It was first introduced over 25 years ago, and today, has been adopted by most oil companies having a large volume of this type of work. Many are familiar with such methods now being followed in recording oil and gas production, purchases and sales; in the disbursements of royalty payments; and in the preparation of related schedules and reports. This paper, therefore, will be confined entirely to the subject of a new procedure for the automatic calculation of run tickets.

The largest manual job remaining in oil accounting today is the calculation and verification of run tickets. Shell, therefore, is proposing an entirely new approach; i.e., the use of punched cards in lieu of tank tables for the determination of gross barrels. It should be understood that the procedure applies only to accounting functions and will not eliminate the use of tank tables where required by operating personnel.

The application and benefits of this procedure to a particular company may vary slightly depending upon the company's organization and practices. Shell Oil Co. is engaged in all phases of the petroleum industry with its exploration and production activities divided into six areas: Houston, Midland, Tulsa, New Orleans, Pacific Coast, and Calgary. Each area's headquarters is a complete branch office performing its own oil accounting and making its own royalty payments.

For practical purposes oil accounting commences with run tickets. In the Midland area where this test is being made, 16,000 tickets are processed monthly. The pipe-line company's gager records both the high and low fluid levels in feet and inches, fills in other required information such as gravity, temperature, etc., and for operating purposes calculates the gross barrels run.

The tickets are then mailed to Shell's Midland accounting office. In the manual procedure, tickets received in the area office were calculated in the following manner: First, the indicated gravities and temperatures were corrected to 60° by the use of an abridged table prepared from the Tag manual. (The Tag manual is a book for the use of inspectors of petroleum and contains in addition to other information, tables for reduction of observed degrees gravity A.P.I. to degrees A.P.I. at 60° F., as well as Circular C410, the abridged table of coefficients for correcting volumes to 60° F.)

Tickets were then corrected for volume by referring to a table of combined suspended b.s. and w. percentages and temperature-correction coefficients. The barrels applicable to the opening gage were obtained from the tank table, placed in a calculator, and multiplied by the above coefficient. Barrels applicable to the second gage were likewise obtained, placed in a calculator, and negatively multiplied. The result represented the net 60° barrels and was recorded in a space provided at the top of the ticket. A second clerk verified the calculation by repeating the process except that instead of referring to the tables, the gross barrels recorded on the ticket by the gager were used. The figure thus obtained was recorded in a space provided in the center of the ticket, and visually compared with the one at the top. This procedure required the full time of four and part time of a fifth clerk.

New method . . . Present lease storage-tank tables are graduated in quarter-inch readings (768 readings for a 16-ft., 500-bbl. tank) and are constructed from factors taken from tank table volume run sheets prepared during tank-calibration operations. These sheets show the number of quarter inches and the barrels per quarter inch in each increment and the point where the barrels per quarter inch vary due to tank structure. **Therefore, the determination of the number of barrels in any tank merely requires multiplying the barrels per quarter inch times the number of quarter inches in each increment and**

*Shell Oil Co., Midland. Paper at fifth oil recovery conference (T.P.R.C.) held at A. & M. College of Texas., College Station.

adding the result of each succeeding calculation until the number of quarter inches gaged is reached.

For example, assume a 16-ft. storage tank has fire incremental changes from the bottom to the top of the tank which is outlined on the tank table volume run sheet, as follows: (Chart 2, Tank Increments from Run Sheet.)

Increment change	Height from tank bottom
1	No inches to 3 ft. 1½ in.
2	3 ft. 1¾ in. to 6 ft. 2½ in.
3	6 ft. 2¾ in. to 9 ft. 4½ in.
4	9 ft. 4¾ in. to 12 ft. 7¾ in.
5	12 ft. 8 in. to 16 ft.

If the tank gage for the first measurement shown on run ticket is 15 ft. 6 in. (744 quarter inches), it will fall within the fifth increment; to arrive at barrels will require the following calculations:

A. Subtract the number of quarter inches in the low reading of the fifth increment (608) from the number of quarter inches in first measurement (744). The result of which is 136 quarter inches.

B. Multiply the results of (A) times fraction of barrels per quarter inch in fifth increment (0.67379 × 136 = 91.6354).

C. To the results of (B) add barrels in preceding increments from tank bottom (416.5711) and the net result of 508.21 bbl. for the first measurement is determined.

If the tank gage for second measurement shown on run ticket is 1 ft. 6 in. (72 quarter inches), it would fall within the first increment; to arrive at barrels will require the following calculations:

A. Subtract the number of quarter inches in the low reading of the first increment (000) from the number of quarter inches in second measurement (72).

B. Multiply the results of (A) times fraction of barrels per quarter inch in first increment (0.69786 × 72 = 50.2459).

Quarter inches from bottom	Fractions of barrels per quarter inch	Barrels in preceding increments from bottom
000 to 150	.69786	None
151 to 298	.68769	104.6790
299 to 450	.68432	206.4571
451 to 607	.67578	310.4737
608 to 768	.67379	416.5711

C. To the results of (B) add barrels in preceding increments from tank bottom (none) and the net result is barrels for second measurement.

D. Subtract barrels in second measurement from barrels in first measurement and the result is gross barrels run for the applicable run ticket (508.21 — 50.25. = 457.96).

At a glance this appears to be an enormous amount of figuring to arrive at the gross barrels on a run ticket; however, it can be accomplished by the I.B.M. 604 electronic calculating punch in two operations at the amazing speed of 100 cards per minute. And the tedious task of referring manually to tank tables has been eliminated.

To calculate gross barrels on the 604 Shell employs a deck of tank-table master cards which are somewhat unusual in their construction. These master cards are constructed to take the place of tank tables, and as previously mentioned, an average of from two to five master cards are required to record the barrels at any level in a lease storage tank.

One master card is prepared for each increment or volume measurement variation that will change the fractional part of a barrel per vertical quarter inch. The card contains the location code, tank number, and tank increment number, the total number of quarter inches from the bottom of the tank for both the upper and lower extremes for the increment, the fractional part of a barrel per quarter inch within the increment, and the total barrels from the lower extreme of the increment to the bottom of the tank. By use of a test deck in conjunction with these tank-table master cards Shell is able to determine for verification purposes that the figure for gross barrels for each quarter inch thus obtained is identical with that shown on the tank table.

The tabulating procedure for processing run tickets begins almost immediately after they are received in the area accounting office, where they are arranged by operating district and bundled in groups of approximately 100. For control purposes, an adding-machine tape is run on each bundle for the total of tank numbers and a transmittal slip completed to indicate the date, bundle number, district, total of tank numbers, and number of tickets.

The tickets with their respective transmittal slips are forwarded to the key punch group in the tabulating section. Here run ticket work cards (Chart 3) showing information punched into

(Continued on page 79)

FACSIMILE OF STORAGE TANK WITH FIVE INCREMENT CHANGES

5TH HIGH	16 FEET (768 QTR INCHES) 5TH INCREMENT .67379 BBLS. PER QTR. INCH
5TH LOW	12'-8"
4TH HIGH	12'-7¾" (607 QTR INCHES) 416.5711 BBLS. 4TH INCREMENT .67578 BBLS. PER QTR. INCH
4TH LOW	9'-4¾"
3RD HIGH	9'-4½" (450 QTR INCHES) 310.4737 BBLS. 3RD INCREMENT .68432 BBLS. PER QTR. INCH
3RD LOW	6'-2¾"
2ND HIGH	6'-2½" (298 QTR INCHES) 206.4571 BBLS. 2ND INCREMENT .68769 BBLS. PER QTR. INCH
2ND LOW	3'-1¾"
1ST HIGH	3'-1½" (150 QTR INCHES) 104.6790 BBLS. 1ST INCREMENT .69786 BBLS. PER QTR. INCH
1ST LOW	NO FEET NO BARRELS

INFORMATION RECORDED IN TABULATING CARD

LOCATION CODE	TANK NO.	INCREMENT NO.	QTR. IN. FROM BOTTOM (LOW)	QTR. IN. FROM BOTTOM (HIGH)	FRACTION OF BBLS. PER QTR. INCH	BARRELS FROM TK. BOTTOM (LOW)
XXX	XXX	5	608	768	.67379	416.5711
XXX	XXX	4	451	607	.67578	310.4737
XXX	XXX	3	299	450	.68432	206.4571
XXX	XXX	2	151	298	.68769	104.6790
XXX	XXX	1	000	150	.69786	000.0000

Chart No. 3.

MAGNOLIA PETROLEUM COMPANY
BOX 900 DALLAS 1, TEXAS

GAS STATEMENT

X-84 Rev.

DATE
DAY | YR.

Dist. 17 VANDERBILT COLORADO
Dist'n 17 DEL REY PETROLEUM CO 2 LB 147
From 17 MAGNOLIA PETROLEUM CO
Lease 17 CHESTERVILLE UNIT GATH STATION

DIST.	STATION	ZONE	CHART ON	CHART OFF	INTEGRATOR READING STOP	INTEGRATOR READING START	INTEGRATOR READING DIFF.	BASE COEFFICIENT		MCF BASE PRESSURE	TEMP. MULT.	MCF FLOW TEMPERATURE		Ppv MULT.	MCF Ppv CORRECTED		PRESSURE QTY. MULT.	MCF STATE STANDARD	
17	5351		1	2	4729	2006	2723	3564	D	9 705	9786	9	497	1 089	10	342	1 13993	11	788
17	5351		2	3	7456	4729	2727	3564	D	9 719	9777	9	502	1 089	10	348	1 13993	11	798
17	5351		3	4	10100	7456	2644	3564	D	9 423	9786	9	221	1 089	10	042	1 13993	11	447
17	5351		4	5	2768	100	2668	3564	D	9 509	9795	9	314	1 089	10	143	1 13993	11	562
17	5351		5	6	5531	2768	2763	3564	D	9 847	9786	9	636	1 089	10	496	1 13993	11	962
17	5351		7	8	10918	8244	2674	3564	D	9 530	9813	9	352	1 089	10	184	1 13993	11	608
17	5351		8	9	3695	918	2777	3564	D	9 897	9804	9	703	1 089	10	567	1 13993	12	046
17	5351		9	10	5534	2813	2721	3564	D	9 698	9813	9	517	1 089	10	364	1 13993	11	814
17	5351		10	11	8234	5534	2700	3564	D	9 623	9813	9	443	1 089	10	283	1 13993	11	722
17	5351		11	12	10906	8234	2672	3564	D	9 523	9813	9	345	1 089	10	177	1 13993	11	601
17	5351		12	13				3564	D								1 13993		
17	5351		13	14				3564	D								1 13993		
17	5351		14	15	3580	906	2674	3564	D	9 530	9804	9	343	1 089	10	175	1 13993	11	599
17	5351		15	16	6300	3580	2720	3564	D	9 694	9795	9	495	1 089	10	340	1 13993	11	787
17	5351		16	17	8987	6300	2687	3564	D	9 576	9804	9	388	1 089	10	224	1 13993	11	655
17	5351		17	18	11752	8987	2765	3564	D	9 854	9777	9	634	1 089	10	491	1 13993	11	959
17	5351		18	19	4476	1752	2724	3564	D	9 708	9795	9	509	1 089	10	355	1 13993	11	804
17	5351		19	20	7231	4476	2755	3564	D	9 819	9777	9	600	1 089	10	454	1 13993	11	917
17	5351		20	21	12055	9354	2701	3564	D	9 626	9786	9	420	1 089	10	258	1 13993	11	693
17	5351		21	22	4782	2055	2727	3564	D	9 719	9786	9	511	1 089	10	357	1 13993	11	806
17	5351		22	23	7557	4782	2775	3564	D	9 890	9813	9	705	1 089	10	569	1 13993	12	048
17	5351		23	24	10342	7557	2785	3564	D	9 926	9850	9	777	1 091	10	667	1 13993	12	160
17	5351		24	25	3135	342	2793	3564	D	9 954	9831	9	786	1 091	10	677	1 13993	12	171
17	5351		25	26	5938	3135	2803	3564	D	9 990	9822	9	812	1 091	10	705	1 13993	12	203
17	5351		26	27	8714	5938	2776	3564	D	9 894	9822	9	718	1 091	10	602	1 13993	12	086
17	5351		27	28	6389	3626	2763	3564	D	9 847	9822	9	672	1 091	10	552	1 13993	12	029
17	5351		28	29	8255	5381	2874	3564	D	10 243	9822	10	061	1 091	10	977	1 13993	12	513
17	5351		29	30	10999	8255	2744	3564	D	9 780	9813	9	597	1 089	10	451	1 13993	11	913
17	5351		30	31	3758	999	2759	3564	D	9 833	9822	9	658	1 091	10	537	1 13993	12	011
17	5351		31	1	6587	3758	2829	3564	D	10 083	9822	9	904	1 091	10	805	1 13993	12	317
30									4	273 440		268	120		292	140		333	019

GAS OR LIQUID CONTENT VALUE OF THE GAS

Total Gas Measured	Test Gallons Per M. C. F.	Total Test Gallons	Percentage Due Lease	Gallons Due Lease	Content Gasoline Price	Price Per M. C. F. Or Per Test Gal.	Gasoline Content or Gas Value	Other Products Value

RESIDUE VALUE OF THE GAS

Volume Residue Allow Extraction and Plant Use	Gas Returned to Lease for Development and Operation	Residue Available For Sale From Meter Station	Total Residue Available For Sale From Plant or Plants	Proportion of Total Residue Sold From Plant or Available Residue Price Factor	Total Residue Sold from Plant or Plants	50% of Net Proceeds From Total Residue Sold from Plant or Plants	Meter Station Residue Net Proceeds	Meter Station Liquid Content or Gas Value and Residue Net Proceeds Before Tax	Tax Deducted and Paid	Meter Station Liquid Content or Gas Value and Residue Net Proceeds After Tax

All of this statement is automatically handled by high-speed business machines.

Computing Gas Volumes From Orifice-Meter Charts Integrator Data . . .

Using a punched-card system

by A. C. Buchanan, Jr. and Hubert Skinner

AT Magnolia Petroleum Co. all punched-card work for the entire company (except Beaumont refinery) is performed by a centralized I.B.M. installation located at the home offices in Dallas. In this one centralized unit are processed and prepared:

1. General accounting and statistical statements of producing, marketing, refinery departments, and Magnolia Pipe Line Co.

Authors with Magnolia Petroleum Co., Dallas. Paper presented at Fifth Oil-Recovery Conference (T.P.R.C.), A. & M. College of Texas, College Station.

2. Oil and gas royalty and payroll checks.

3. Depreciation and depletion schedules.

4. Stationary department controls and prices.

5. Accident and fire-prevention statistics.

6. Tank-car movements and mileage reports.

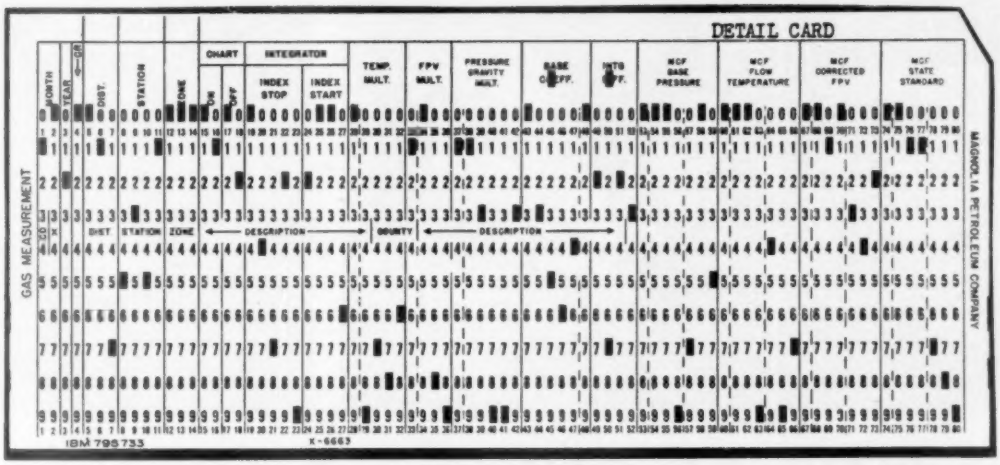
7. Petroleum research.

In applying a problem to punched cards, several factors are to be considered. Is there sufficient volume? Are calculations and handling fairly uniform? How many uses can be made of the key punched cards?

Magnolia certainly had enough volume in one particular operation—14,000 orifice-meter gas charts per month.

Gas Statement

One of Magnolia's gas statements (above) shows printed result of calculations on one meter for a month. The four lines at the heading adequately describe the location of the meter, des-



Typical punch card of orifice-meter data as they go through the business-machine section of Magnolia Petroleum Co.

tination of the gas, operator of the lease, and name of the lease.

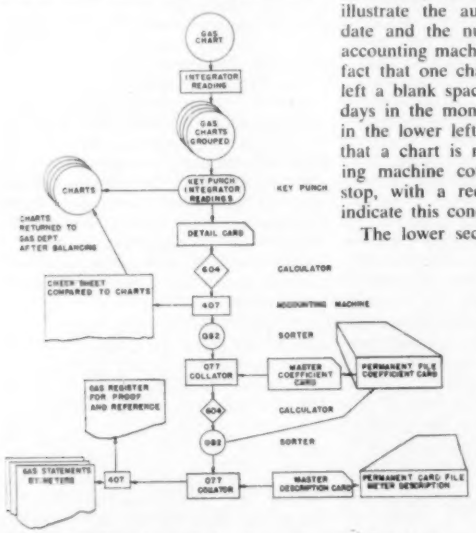
The body of the statement lists district and station (or meter number), the day the chart was placed on the meter, and the day removed, and the integrator "start" and "stop" counter readings.

Four calculated and adjusted volumes in thousand cubic feet are shown for each chart, along with the coefficients and adjustment factors. A statement of this nature gives the accounting department the four volume figures in each chart, with corresponding totals for the month. Any one of these totals, as required, may be used in calculating the settlement and taxes on gas delivered.

On those meters where temperatures, Fpv, and pressure gravity adjustments do not apply, the cubic feet at base pressure is shown in all four columns with the proper totals.

The 30, in the lower left section under the listing, indicates the total number of charts for the month. One card, representing the chart for the sixth of the month, was intentionally omitted to illustrate the automatic audit of the date and the number of charts. The accounting machine has recognized the fact that one chart is missing and has left a blank space. Since there are 31 days in the month of October, the 30 in the lower left section also indicates that a chart is missing. The accounting machine could also be wired to stop, with a red light turned on, to indicate this condition.

The lower section of the gas statement is used to calculate the payment for the gas delivered. On those meters where the gas is not fed to gasoline plants and the contracts are fairly uniform, the calculation of taxes and the distribution of payments are handled on the same procedure and in many cases on the same panels and machines, as are oil royalty checks. This is a decided advantage of using punched cards for gas measurement, for in those cases where the distribution of interest for both oil and gas is identical, the payment of royalty can be combined.



Magnolia Petroleum's punched-card procedure (flow plan) on gas-measurement orifice-meter charts.

The basic plan for preparation of the gas statement is shown in the procedure flow chart. The charts are grouped according to type and processed by the chart integrator. The individual start and stop readings are recorded on each chart by the operator and, at the completion of the group, a control slip is attached, showing the start and stop readings for the entire group of charts. Charts with no deliveries indicated are included in the groups, as are charts on the meter during the day a plate change was made.

When a plate change is made the coefficient will naturally change. The gas accounting section notifies the tabulating department by stapling a notice of plate change to the edge of the chart. When the charts are received in the tabulating department, a key-punch operator prepares a new coefficient card for each notice of plate change, showing the new coefficient, district and station number, and date of change.

The charts are passed to another key-punch operator and a card is prepared for each chart, showing the month and year, station and district code, day on and off for the chart, integrator index stop and index start readings, and temperature and Fpv multiplier, if any.

The cards and charts are then key verified and passed to the accounting machine operator, who passes them

(Continued on page 79)

Digital Computation of Resistivity-Departure Curves

Here's how Continental used M.I.T.'s $10,000,000 Whirlwind 1. This electric brain made 10,000,000 arithmetic operations for Conoco every 10 minutes

by Dr. Leendert de Witte*
With Dr. S. P. Frankel† and Dr. J. D. Porter‡

ELECTRICAL surveys in drill holes measure potentials induced by a system of current electrodes at certain specified distances from these current electrodes. These potentials are converted to the so-called "apparent resistivities" of the medium surrounding the electrode system. The apparent resistivities are recorded as a continuous function of depth in the drill hole as the logging sonde is moved up from the bottom of the hole to the surface. The recorded curves are known as resistivity logs.

Apart from their great value for subsurface geological correlations, the resistivity curves are being used more and more to furnish information on the exact location of porous and oil-bearing strata and to obtain approximations to the actual porosity and oil saturation of these strata.

The first major step in the analysis of resistivity logs for quantitative evaluation of porosities and oil saturations is to interpret the apparent resistivities in terms of the actual in-place resistivities of the formations. This is done with the aid of so-called "resistivity departure curves," which depict the theoretical relations between the apparent resistivities and the actual distribution of in-place formation resistivities.

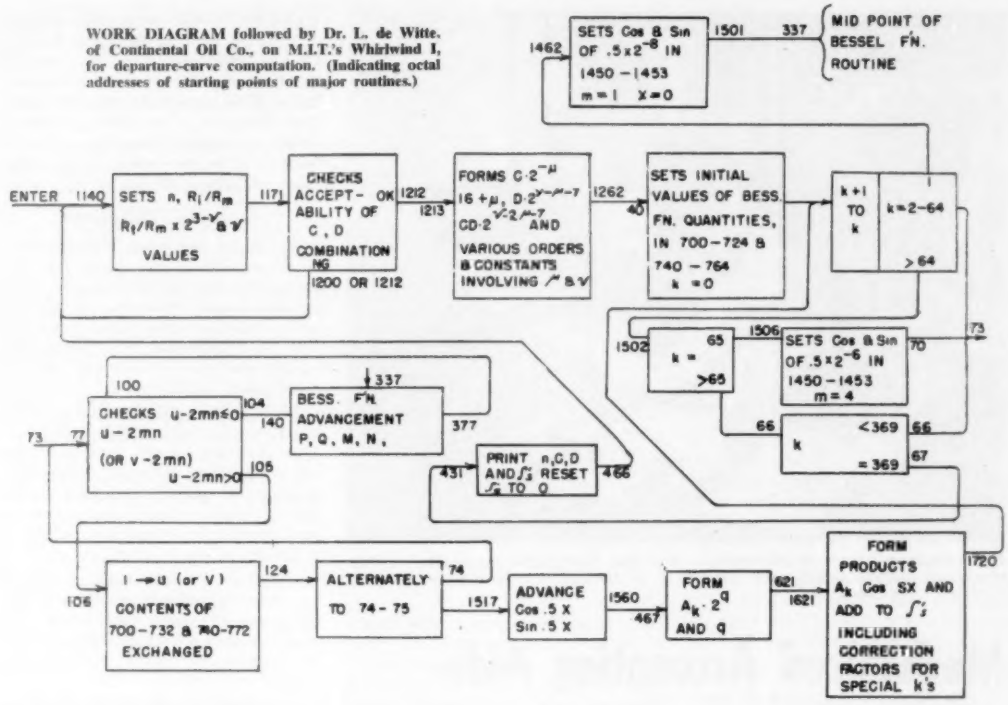
Porous formations are usually invaded by drilling fluid to a given extent beyond the bore face. This creates an invaded zone of a different resistivity from the undisturbed true-formation resistivity. The apparent resistivities measured on the logs are influenced as well by the invaded-zone resistivity and extent of invasion as by the true-formation resistivity beyond the invaded zone.

If we measure three apparent resistivities for each formation for three basically different electrode configurations, it is theoretically possible to combine these three readings in order to solve for the three unknown quantities consisting of the invaded-zone resistivity, the extent of invasion, and the true-formation resistivity. To do this, the departure-curve data for the various electrode systems are combined in the form of "simplified departure curves," which give direct graphical solutions of the simultaneous equations for the measured apparent resistivities.

As the invaded zone is mainly saturated with filtrate from the drilling mud, the resistivity of which can be determined at the surface, the resistivity of the invaded zone divided by the mud-filtrate resistivity will be a measure of the amount of pore space available to current conduction. This furnishes a means of calculating porosity and also of calculating the resistivity which the formation would have if 100 per cent saturated with an electrolyte of different concentration from that of the mud filtrate. In this manner we can find what the resistivity of the formation would be if completely saturated with its own formation water. If any part of the water is replaced by oil, the resistivity will be higher; and the ratio of the measured undisturbed formation resistivity to the calculated resistivity of the formation at 100 per cent water saturation serves as a basis for the computation of the percentage of pore space filled with oil.

As most sedimentary layers are of quite limited thickness, the apparent resistivity measured for any given horizon will usually be influenced by effects of the adjacent beds. The corrections for adjacent bed effects are extremely complicated; and for the conventional arrangements of one current electrode with one or more potential pickup electrodes, the corrections are often so large that the accuracy and resolution of the measurements become too poor for practical application.

*Continental Oil Co., Ponca City, Okla., †head of digital computing group, California Institute of Technology; and ‡Massachusetts Institute of Technology, digital computer laboratory. Summary of paper presented at Fifth Oil Recovery Conference (T.P.R.C.) held at Texas A. & M. College, College Station, Tex.



WORK DIAGRAM followed by Dr. L. de Witte, of Continental Oil Co., on M.I.T.'s Whirlwind I, for departure-curve computation. (Indicating octal addresses of starting points of major routines.)

To minimize these effects, multielectrode combinations have been devised which form a focused current sheet of relatively small thickness and which permit the exploration of thin beds with little or no effects from the adjacent horizons.

The potentials measured by these multielectrode systems can be calculated by the superposition of potentials obtained with single-electrode systems. In order to perform these calculations accurately, the theoretical potentials for all the values of true formation resistivities, extents of invasion, and invaded-zone resistivities must be known with great precision at a large number of distances from the single-point current electrodes.

A number of calculations for single-point electrodes has been published by Schlumberger Well Surveying Corp. However, in order to determine the optimum combination of multielectrode arrangements and to compile simplified-departure curves for these arrangements covering the entire range of resistivities and invasion diameters that are of practical interest, a much more extensive set of data is needed.

To this purpose, Continental and M.I.T. has started the computation of a complete set of resistivity-departure curves on Whirlwind I.

Derivation of equations . . . The analytical expression from which the departure curves are calculated is a solution of Laplace's equation in cylindrical coordinates, obeying the boundary conditions of continuity of potential and of the normal component of current density at each boundary. The computations require integration of the product of a combination of modified Bessel functions and a cosine.

Whirlwind I is a high-speed digital computer having at the present time an electrostatic memory of 1,024 words of 15 binary digits plus a sign digit and an accumulator of similar length. The B-register can be used as a 15-digit extension of the accumulator. An addition requires 48 micro seconds (more than 20,000 additions can be performed per second), a multiplication requires 65 micro seconds.

Because of the limited storage both the modified Bessel functions and the cosines have to be recomputed from their difference equations for each change in the assumed resistivity distribution. Apparent resistivities for 22 different spacings are evaluated simultaneously. The computation of these 22 points for one departure curve requires 10 minutes' machine time and involves some 10 million arithmetic operations. The curves, when completed, will be made generally available to the industry.

"There are some who feel that these developments are the beginning of a second industrial revolution; that the first industrial revolution replaced the strength and sweat of man by the machine; that the steam shovel made the visible muscular effort of the human of no value . . . that this second industrial revolution, with its automatic factories, may replace the human brain in many of its activities. Therefore, man's effort is becoming decreasingly salable.

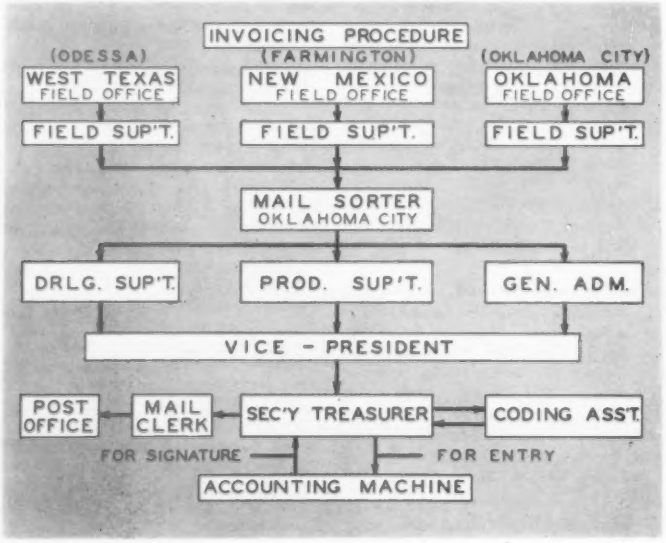
"I do not agree. The development of these computers has been a triumph of human ingenuity and their future development and application will provide an even greater challenge to the human mind. In fact, I see no other vehicle to which these amazing techniques can be directed toward the betterment of human welfare."

—Dr. H. T. Engstrom, vice president, Engineering Associates, Inc.

BUSINESS MACHINES IN DRILLING... Mrs. Jack Horn, accounting-machine operator-bookkeeper, prepares payroll check shown by F. F. Godfrey, secretary-treasurer, Big Chief Drilling Co., Oklahoma City.

Mechanized Accounting Aids Major Drilling Contractor

by Joseph A. Kornfeld
Mid-Continent District Editor



MECHANIZED accounting adopted during 1951 by Big Chief Drilling Co., of Oklahoma City, has enabled this firm to gear up its accounting system to keep pace with company expansion. Moreover, it has made possible to obtain increased productivity from a force of 10 people working in an office space of only 1,500 sq. ft.

Accounting Background

The factor that led to mechanization of accounting at Big Chief was the foreseeable need of additional accounting-department personnel to handle work expansion. This would require at least two additional persons, one stenographer to write invoices, and one bookkeeper.

During 1951, the firm found itself 30 days behind current operations. This condition would be true under any accounting system due to the lack of personnel and time requirements for journal entry making, preparation to detail breakdown of analyses, and cross-balancing.

Big Chief did not wish to expand and then be forced to reduce accounting personnel during slack times. The firm recognized the moral obligation of employment stability to its personnel.

"I expected a lot more difficulty than we experienced," said F. F. Godfrey, secretary-treasurer, in commenting on the changeover to the mechanical accounting procedure.

Advantages

The magnitude of automatic accounting in the Big Chief accounting department may amount to as much as two-thirds of the accounting routine. Moreover, what the machine does automatically, the operator cannot do in error. Mechanically, one cannot get out of balance with the machine.

A series of ciphers appears at the right-hand column when the machine is in balance; any deviation will automatically appear in the form of significant figures as a signal to the operator.

The success of mechanized accounting, however, lies in the training of an efficient machine operator to post the ledger, handle invoices, and write invoices and payroll checks.

Big Chief Drilling Co. handles:

- **Up to 10,000** individual invoices per month from 500 different suppliers.
- **Payment of $500,000** in purchases per month.
- **A payroll** of 249 permanent employes.

• **Business in** five southwestern states.

Machine Functions

Among the functions performed by mechanized accounting at Big Chief are:

- **Payroll check writing** and accounting.
- **Cost records**—production.
- **Cost records**—drilling.
- **Complete ledger** accounting.
- **Payout status**-profitability.
- **Oil production** accounting.

The machine assists in the preparation of reports to the federal and state governments on social security and unemployment reports.

Cost Control

Application of mechanized accounting to operations enables cost control as follows:

- **Cost per day** on each rig.
- **Over-all cost** once every 2 months.
- **Cumulative cost** of drilling wells by rigs.
- **Cumulative** rig costs by items.
- **Cumulative** rig costs by rigs.
- **Cumulative** production income.
- **Cumulative** production costs.
- **Cumulative** production profits.

Payroll Breakdown

Payroll accounting is similar to that of other industries.

The permanent payroll at Big Chief is comprised of 249 employes as follows:

Rig employes	180
Production employes	20
Office	15
Supervisors	15
Truck drivers	10
Management	9
Total permanent payroll	249

Ledger Posting

Ledger posting is done in a single operation. The machine posts the following entries: (1) account payable, (2) voucher journal, (3) control, and (4) individual direct cost.

Invoice Handling

Procedure for handling of invoices is shown in an accompanying chart. Invoices may originate from any of the three field offices: Odessa, Tex.; Farmington, N. M.; or Oklahoma City. After approval by the field superintendent, the invoice is mailed to the Oklahoma City general office.

Invoices are then routed to the drilling superintendent, the production superintendent, or to general administration as the case may be. After review, they are sent to the vice president for final approval.

Invoices are then sent to the secretary-treasurer who refers them to a coding assistant prior to placing them with the accounting machine operator for entry and check writing. These are signed by the secretary - treasurer and mailed.

Acknowledgments

The author acknowledges the cooperation of the management of Big Chief Drilling Co. and especially that of F. F. Godfrey, secretary-treasurer, Oklahoma City. R. G. Carrington, manager at Oklahoma City, and Hugh E. Tyson, Jr., Tulsa, both with National Cash Register Co., offered valuable suggestions.

Petroleum-Engineering File on Punched Cards

(Continued from page 64)

described in detail, is a complete article in itself. For that reason, only a few procedures and applications which are not readily apparent, are outlined here, as follows:

Coordinate system and master well cards . . . This application cannot be overemphasized. It is obvious how to machine-select data by company, lease, depth, pressure, date, etc., but selecting data by geographical location is a more complex problem. Well numbers usually are assigned in random geographical sequence throughout a lease. Leases and operating companies are distributed throughout a field in irregular patterns. To select data pertaining to a specific segment of a reservoir, or pertaining to a specific geographic location, it is necessary to assign coordinate numbers to each well.

Our first coordinate system was designed to fit the tray of the sorting machine and included zero, 11, and 12 punches. Coordinate numbers were assigned to each well and a deck of master cards punched with company, lease, well, and coordinate fields.

The sorting-machine operator could select from this file a card for each well within any coordinate boundary which was outlined upon a map. These selected master well cards could then be used with the collator to pull from the file any data pertaining to the area of interest.

This was the purpose for which the coordinate and master card system was conceived. It was then found that if data were listed in a coordinate sequence when prepared for a draftsman to transcribe onto maps for study or contouring, the time required by the drafting room could be reduced by a factor of almost 50 per cent. Drafting errors were also reduced.

The next idea regarding a coordinate system came as a result of working with areas with complex boundaries requiring many sorting operations. It was found to be possible to select the desired master cards by using a collator. This procedure is outlined in Fig. 5. The coordinate boundaries were recorded on a mimeographed form, punched, and verified into cards; and, by one pass through the collator, master well cards could be selected to comply with as many as three pairs of horizontal limits and an unlimited number of vertical limits.

It was also found convenient to punch elevation, total depth, deepest zone penetrated, perforation depth, casing size and other significant well data into the master cards. This was not only a convenient place to record these data, but specifications for selection around these paramenters could be set up in the collator in addition to coordinate boundary specifications—for example, select all wells from a given area which are perforated at a depth of more than 4,000 ft. below sea level and are completed with casing of more than 6 in. in diameter.

Controlled merging of various files . . . Another application of machine processing found to be useful was the controlled merging of drill-stem-test and core-analysis data with data interpreted from electric logs reflecting revised geologic correlations.

The files in question contained analysis data for approximately 13,000 core samples and 11,500 reports on the results of drill-stem testing (multiple records of many tests were in the file as a result of reports obtained from daily reports, engineering, and geological departments). A total of approximately 11,000 sands had been identified, correlated, and recorded from 750 logs. The correct elevation for each well was machine-selected from the master well file and subsea depths computed by machine for all depths in all three files.

By using the file containing the new geologic correlations as a control file, core analysis and drill-stem-test data were selected in depth groups according to the new correlations and irrespective of the zone designations which had been originally assigned them during the development of the field.

The data were then listed on the tabulating machine. Lists were prepared on both a well-by-well basis and a reservoir-by-reservoir basis. This entire

procedure was accomplished by one man in a mere fraction of the time which would have been required by a sizable staff to sort the data from the files, type, and proof it.

Relieving Engineers of Clerical Detail

Engineers are often burdened with large volumes of clerical detail while performing interpretative work. For instance, when interpreting an electric log (Fig. 6), the following factors are determined:

1. Top and base of sand converted to depths below sea level.
2. Gross sand interval.
3. Net oil sand.
4. Net gas sand.
5. Total net sand.

In addition to interpreting and reading depths from the log, the determination of these quantities requires between 5 and 15 subtraction operations and 5 and 10 additions (depending upon location of gas-oil and oil-water contacts). These arithmetic operations may be performed by the engineer or geologist as the log is interpreted, or they may be assigned to clerical help.

This procedure has been mechanized, and, in a recent application, two men each examined a total of 11,000 sand sections in 750 electric logs, recording well and zone identification with depths, as illustrated in Fig. 6. The data were punched into cards, verified, and approximately 300,000 arithmetic operations performed by machine to obtain the required data from each man's interpretations.

The two sets of interpretations were then merged and compared by machine, requiring 66,000 more arithmetic operations. The data (now 250,000 numbers) were listed with significant differences highlighted. A third man reviewed the significant differences and decided which interpretation was the more reasonable.

The final interpretations were then averaged (165,000 arithmetic operations) and lists printed both by reservoir and by well for reference files and for the draftsmen.

Mechanization of this procedure has resulted in a more efficient utilization of the engineers' time who were doing the interpretative work, and it has eliminated countless hours of tedious clerical detail. Also, it has expedited the drafting-room work associated with the project and has enabled those supervising the work and in charge of the program to maintain a detailed check upon the work.

In addition, a punched-card file has been prepared for which new uses are being discovered each day.

Sand-Volume Computation From Isopach Maps

(Continued from page 65)

age by the number of rectangles which it encloses.

Sometimes it is desirable to weight sand thickness with factors such as water content, porosity, structural position, well potential, or other factors which vary with location on the map. One of these factors may be inserted in the rectangles along with T and F and the formula becomes:

$$\text{Adjusted or weighted sand volume, in acre-feet} = (\Sigma) (fFT) K$$

where f is the weighting factor.

The calculating punch then computes simultaneously both actual and adjusted sand volumes in acre-feet and punches the two answers into a summary card.

The summary cards are sorted into the required sequence and sand volume data are combined and listed to form any number of different summary tables.

Equipment Required

A rectangular grid must first be prepared and reproduced to obtain a transparent copy. Matte film positive is a satisfactory transparent material. Paper copies may be reproduced from it and used for permanent multiple records. The film is cleaned with carbon tetrachloride and used again.

A grid of convenient size has been prepared with 40-acre squares outlined with solid lines, 10-acre subdivisions within each square outlined by dotted lines, and the center of each 10-acre square indicated by a small cross. With this grid, thicknesses may be selected for 40-acre, 10-acre, or 2.5-acre tracts, whichever is the most convenient.

If there are many maps to be prepared for a group of leases, it may be convenient to prepare a grid by subdividing the known lease acreages into rectangles of equal area. A grid prepared in this manner is useful only on the lease for which it was prepared.

The card-punching and machine procedures are simple and straightforward. Any machine installation should handle the work without special training for the operators.

Interpretation Procedure

The interpretation procedure is simple. Thicknesses representing the productive area of each one of the superimposed rectangles are read from the isopach map.

Tests made with several engineers reveal that each man develops his own preferred method of arriving at the thickness values for each rectangle, with no appreciable difference in volumes obtained. If the isopach lines are regular and smooth, an arbitrary system of selecting a thickness corresponding to the midpoint of the productive portion of each rectangle is the quickest method.

The greatest source of error was found to be caused by mistaken identification of isopach lines. For this reason, these lines should be numbered frequently and plainly.

The lease on which the tests were made contained 600 productive acres. No significant differences were obtained between volumes determined from 2.5 and 10-acre grids.

Allocating Battery Oil and Gas Production

(Continued from page 69)

nected. A list is made of the comparisons. If the result of the comparison is a zero balance, only the identification data of the battery are printed. If, however, the data do not result in a zero balance, then the battery data and the summations of the well data are shown. Any discrepancies disclosed by this procedure are rectified.

The decks are separated and the battery production deck is routed to the file.

Bringing Forward Cumulatives

To complete the current month's well-production deck, it is necessary to bring forward cumulative data.

This is accomplished by merging (Fig. 5) the previous month's well-production deck with the current month's, with the previous month's card inserted immediately ahead of the corresponding card of the current month. Cards containing only identification data, required to place these cards correctly, are also merged so that appropriate totals such as for company, lease, or zone may be obtained. The merged deck is passed through the calculating punch and the following operations are performed:

1. The cumulative oil, gas, and water-production data from the previous month's card are added, respectively, to the oil, gas, and water-production data of the current month's card.
2. The new cumulatives are punched into the current month's well-production card and are also read into counters to be accumulated so that

company, lease, or zone totals may be obtained.

3. The current month's production data are read to other counters to accumulate the desired totals for company, lease, or zone data.

4. As a check, the previous month's data are read to other counters to accumulate totals for company, lease or zone.

5. The sum of the totals from operations (3) and (4) above are compared to the sums of the cumulatives which were obtained in operation (1) and were accumulated in (2) above.

The results of operations (2), (3), are punched into the cards provided for the desired totals. If the comparison of (5) results in a zero balance, a verification punch or punches are placed in specified fields in the total card.

The bringing forward of cumulatives is thus verified except for possible failures of the punch unit. Such failures can be found by passing the merged deck through the tabulator for a check list for zero balance as described in the checking procedure for battery factors.

Applications of Punched-Card File of Individual Well Production

The punched-card file of individual well production provides a means of readily making many engineering and statistical studies pertinent to efficient and economic control of wells and reservoirs.

Detailed reports of the production histories of wells, reservoir segments, reservoirs, leases, and fields are readily available from the records. Together with other punched-card records of basic data, statistical studies of distribution of withdrawals, of gas volumes produced at various well head pressures, of gas-oil ratios of various reservoir segments as a function of withdrawals and numerous other studies involving correlation of large volumes of data, can be made.

Production data on punched cards can be used in machine programed calculations of economic limits for producing wells, of volumetric balance, and other similar engineering calculations.

Calculation of Crude-Oil Run Tickets

(Continued from page 71)

run ticket work cards, are key punched and key verified for such information as location code, date, bundle number, ticket number, tank number, indicated gravity and temperature, tank temperature, b.s. and w., and the feet and inches for the first and second measurements. A tabulation of the totals for tank number and number of tickets will verify that cards were cut for all tickets and that the tank numbers are correct.

The electronic calculator is now employed to simultaneously convert the feet and inches into the number of quarter inches for both the first and second measurements and punch the two results. The next calculation determines gross barrels for the second or low gage measurement. For this operation the run ticket work cards are sorted in order by (1) location, (2) tank number, and (3) in ascending order from the smallest to the largest number of quarter inches in the second measurement.

These cards are then collated against the master tank-table cards, selecting the appropriate increment master card pertaining to the number of quarter inches in the second measurement. The master cards are merged in front of their respective work cards.

The calculator now determines the number of barrels of oil within the respective increment where the second measurement occurs and adds this to the total barrels that exist from the lower extreme of that particular increment to the bottom of the tank. The result is the total gross barrels for the second measurement which is punched into the work card.

These work cards are then separated from their master cards and the procedure repeated to determine the gross barrels for the first or high gage using the appropriate masters except that instead of punching the result it is held until the barrels for the second measurement are subtracted and the difference punched for the gross barrels.

Once the gross barrels are calculated, the electronic computer is again brought into use to convert the gross barrels into 60° barrels. This is done by means of factors recorded in punched cards which will correct indicated gravity to 60°, gross volume to 60°, and then deduct suspended b.s. and w. Therefore, the manual processing of run tickets to determine net 60° volume of oil run, which required four clerks to perform, is no longer required. The weekly machine time required is estimated at 16 hours, 4 hours of which is calculating time, and the remainder on auxiliary machines which can be absorbed with present equipment.

From this stage of the procedure, the cards are accumulated for 1 week before moving into the pricing operations. Since the price of crude oil is determined by grade and 60° gravity, it is necessary to have these two figures in each run ticket card. To this point we have only the 60° gravity. The grade or price group as we call it is gang punched from the lease master card which is a permanent card where all pertinent information concerning the lease is retained.

The run-ticket cards are sorted to 60° gravity, then price grouped and merged behind their representative master price card. These master price cards are prepared from the Shell price bulletin, one card for each gravity within each price group which also carries the applicable price.

The price is gang punched from the master into the run ticket cards and is multiplied by the net barrels to obtain gross value. A tabulated run with totals on each gravity and price group is used to verify the multiplications by manually extending group totals. The gravity and net barrels by district are checked against the weekly totals on the control sheet, and the gross value is then added.

The run-ticket cards thus calculated through gravity, net barrels, and gross value are set aside until month end.

Summary

The completely mechanized operation just discussed will eliminate most of the human errors that are experienced in the manual calculation of run tickets as well as materially speedup the entire operation. Also to be considered is the fact that the manual calculation of run tickets is tedious and monotonous and it is difficult to keep an employe on this type of work for long periods of time. Therefore, we eliminate the resulting large turnover of help.

Computing Gas Volumes

(Continued from page 73)

through the electronic calculator in the same sequence. This operation subtracts the start readings from the stop readings and punches the difference. The cards are then processed by the printer (I.B.M. 407), where a cross-control is applied to the start and stop readings to assure that the stop reading on one chart is the same as the start reading on the next chart. If these figures are not the same, the accounting machine can be wired to stop or extra space as in the gas statement.

At the same time, the differences

on each chart are being added for each group. This total, when checked against the total difference on the control slip for that group, assures that all stop and start readings have been entered on the chart properly, have been key punched accurately, and that there have been no crossfooting or punching errors on the 604 calculator.

The control slips are posted to a ledger by hand, and at the end of the month are used to balance the charts by districts, to eliminate the possibility of a misplaced card during the month. The gas charts are returned to the accounting department and the detail cards are matched against the master coefficient deck, which has been previously corrected with plate changes. By matching the detail cards, by dates and by station codes, the plate changes with the corrected coefficient are automatically placed in front of the proper detail cards. The merged file is passed through the 604 calculator and the four volumes are punched on the card. At the same time, the coefficient and pressure gravity multipliers are gang punched from the master coefficient card to the detail card. Since Magnolia has two 604 calculators in its installation, the cards are passed through the other calculator, in another panel, for a positive check of the calculations.

A proof register of the cards is listed, the totals balanced against the control ledger, and the listing returned to the accounting department for examination and reference. At the end of the month the detail calculated cards are sorted by date and station and matched against the master description cards. The completed file is placed in the 407 printer and the gas statement previously discussed is prepared for each meter.

During the printing of the gas statement, one card is automatically prepared for the totals shown on the gas statement, with the identifying codes. This summary card for each meter is used to calculate the value and taxes for the monthly deliveries of gas. The resulting figures are applied against the division of interest cards for distribution of the payment.

An examination of this system reveals these advantages. As mentioned before, the system could be applied to almost any installation of punched-card accounting machines, regardless of the models. The procedure is not involved, and normally may be added to existing installations without obtaining a complete set of machines, since any idle time during the month could be utilized for some of the calculating and proof work.

By the use of four volumes, numerous adjustments may be made for contract variations, meter or machine adjustments. Seldom will it be necessary to use all four volumes on any one meter. For example, if charts are used with a range of inches and pounds, other than the ones for which the integrator is designed, a machine constant can be applied to the coefficient.

Also, if the range of the meter and pressure spring is other than 100 in.-100 psi., a meter factor can also be applied to the coefficient. The coefficient as used at Magnolia has the following factors: (1) Basic coefficient at 60° F., (2) pressure base factor, (3) specific gravity, (4) machine constant, and (5) meter factor.

Other improvements will suggest themselves to the prospective user of this method. One variation would be the use of a mark sensing punch. At the first of each month, a set of detail cards could be prepared for each meter on each day. As the charts were read, the start and stop readings could be entered on the proper card with a pencil by the integrator operator, and then passed through the mark sensing punch at 100 cards per minute. This would eliminate the comparatively slow and costly key-punching operation.

By the use of punched cards for gas measurement, we have a degree of accuracy and speed obtainable by manual methods.

Steel—Service Team

In there—Pushing

Now more than ever the help of an experienced steel-service organization is especially valuable. That's why it may well pay to get in touch with the nearest Ryerson office or plant.

Not that we can *always* furnish the steel you need—much as we would like to, and hard as we try. But, with controls relaxing a little and a few steel products coming into better supply, there are more opportunities for experience and ingenuity to take over. And experience, ingenuity—and the will to help are never in short supply at Ryerson.

Your nearby Ryerson plant is staffed with specialists on carbon, alloy and stainless steels who are always ready to work with you. Often they can suggest practical alternates when the steel you need is not available. And back of the Ryerson plant nearest you stand the resources of fourteen other Ryerson plants, making up the nation's largest steel-service organization. So when a kind or size is not on hand locally, we may be able to ship it from another plant.

With all Ryerson plants cooperating, and with Ryerson specialists helping to make the most of available steel, we are usually able to maintain service in spite of the current situation. So we suggest that you check with us regularly for all your steel requirements . . . There is nothing too difficult when it comes to working with a Ryerson customer.

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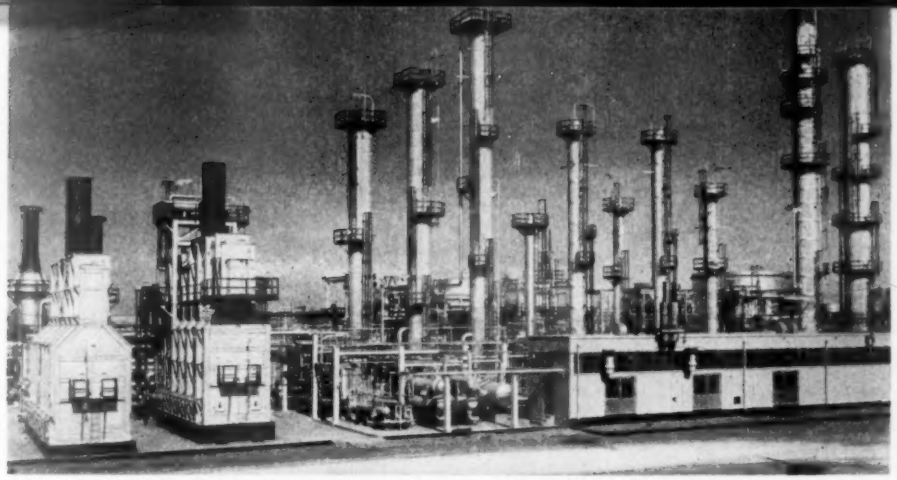


Over-all view of Platforming and Udex units at refinery of Cosden Petroleum Corp., Big Spring, Tex.

PETROCHEM REPORT:

Cosden Produces Nitration-Grade Aromatics

New project is major step in expansion directed toward product diversification

NITRATION-GRADE benzene, toluene, and xylene are being produced at the Big Spring, Tex., refinery of Cosden Petroleum Corp.

These materials are manufactured in a Platformer-Udex combination unit placed on stream on September 14, 1952. These new facilities represent a closely coordinated series of operations carefully engineered for efficiency and economy in operation, and instrumented for the precise control required to insure the production of aromatic fractions that must continuously meet rigid specifications.

The new integrated facilities include a feed-preparation section, a U.O.P. Platforming unit, a Udex unit for aromatic extraction, and a fractionation section for the separation of the Udex extract into the finished benzene, toluene, and xylene fraction, meeting nitration-grade specifications.

New expansion . . . The project received careful study on the part of Cosden's engineers. Although the refinery had already established a separate department to handle the manufacture and sale of specialty products, the production of aromatics represented a major step in the company's expansion program directed toward diversification of products.

A survey was made of the potential market for aromatics. It was on the basis of this study that the decision was made to produce the three aromatics—benzene, toluene, and xylene. The study also showed clearly that if Cosden were to maintain its position of producing premium-quality gasoline, serious consideration would have to be given to the upgrading of the heavy 270°-400° F. naphtha fraction remaining after processing of the 150° to 270° F. fraction for aromatic production.

The U.O.P. Platforming process was selected for the dual job of dehydrogenating the low-boiling naphthenes present in the 150° to 270° F. fraction of the straightrun gasoline to produce corresponding aromatics and upgrading the remaining heavy 270° to 400° F. naphtha to produce a high-octane blending component of desired volatility to increase Cosden's production of high-quality gasoline.

The Udex process, originated by Dow Chemical Co. and engineered and licensed by Universal Oil Products Co., was installed for aromatic extraction. Procon, Inc., Des Plaines, Ill., was selected to handle the construction of these new units.

In the relatively brief period since these facilities have been in operation, it has been satisfactorily demonstrated that both the predicted quantity and quality of all the specific products can be maintained continuously. The benzene produced from the new unit is of such excellent quality that in addition to easily meeting the nitration-grade specifications, it can also be made to meet the rigid A.S.T.M. reagent-grade benzene specification. The benzene product inspection results are tabulated in Table I.

Process Description

The refinery processes a mixture of West Texas crudes totaling 30,000 bbl. per day. The total straightrun gasoline below 400° F. end point contained in the crude is first separated from the crude at the topping unit. The charge, which has a sulfur content of about 0.2 wt. per cent, is processed in an existing clay treater.

The first processing step in the new units is fractionation of the total straightrun gasoline in a series of three towers for the purpose of preparing the individual naphtha fractions as feed for the Platforming unit and stabilizing the light fraction of the straightrun. The first tower in the feed-preparation section is a depentanizer taking overhead the pentane and lighter fraction which is then sent to the light straightrun stabilizer for depropanization.

The bottoms from the depentanizer is then pumped to a charge splitter which separates the depentanized straightrun into an overhead 150° to 270° F. fraction and a bottoms 270° to 400° F. fraction. The individual fractions are sent to intermediate floating-roof storage from where they are charged to the Platforming unit.

Platforming unit . . . In order to meet the dual requirement of producing high yield of aromatics and upgrading the heavy naphtha fraction for motor-gasoline blending, the processing schedule was set up for a blocked-out operation on the Platforming unit.

TABLE I—INSPECTION OF AROMATIC PRODUCTS FROM UDEX UNIT

	Benzene		Toluene		Xylene	
	A.S.T.M. nitration grade specs.	Udex product	A.S.T.M. nitration grade specs.	Udex product	A.S.T.M. nitration grade specs.	Udex product
Specific gravity	0.8820-0.8860	0.8849	0.8690-0.8730	0.8724	0.8650-0.8700	0.8724
Color	(*)	Passes	(*)	Passes	(*)	Passes
Solidifying point, °C.	>4.85	5.49				
Acid wash color:						
Acid phase	<2	0	<2	0+	<6	0+
Hydrocarbon phase	No change	Passes	No change	Passes	No change	Passes
Acidity	No free acid	Passes	No free acid	Passes	No free acid	Passes
Sulfur compounds	(‡)	Passes	(‡)	Passes	(‡)	Passes
Sulfur, weight per cent						0.0008
Copper corrosion	(†)	Passes	(†)	Passes	(†)	Passes
100 ml. distillation:						
Range, °C.	<1	0.6	<1	1.0	<3	2.6
Included temperature, °C.	80.1	Passes	110.6 ± 0.1	Passes	139.3	Passes
Initial boiling point		79.8		110.2		139.0
10 per cent		80.0		110.4		139.2
50 per cent		80.1		110.8		139.8
90 per cent		80.2		111.0		140.4
End point		80.4		111.2		141.6

*Not darker than solution 0.0030 g. $K_2Cr_2O_7$ in 1 l. of water. †No iridescence or discoloration. ‡Free of H_2S and SO_2.

On the alternate Platforming unit operating cycle for motor-fuel production the unit is fed with the heavy naphtha cut of 270° to 400° F. boiling range. Balancing the motor-fuel operation with the aromatic operation and consuming the available naphtha, the charge to the unit during the motor-fuel operation has been approximately 3,500 bbl. per day. Operating conditions during the motor-fuel operation have been controlled so as to produce a stabilized platformate having a leaded F-1 octane number of 95 to 95.5. The yield of stabilized platformate at this octane number level has been 94.5 to 95.5 volume per cent of the charge.

When operating to produce aromatics for charging to the extraction unit, the Platforming unit is charged with the 150° F. to 270° F. prefractionated stock from storage. The processing conditions are set on the reaction section to favor maximum isomerization of the branched cyclopentanes to the corresponding cyclohexanes and dehydrogenation of the six-membered ring hydrocarbons to the corresponding aromatics. The average charge rate during the aromatic operation to balance the time schedule on the blocked-out operation and to consume the available charge stock has been between 2,000 and 2,300 bbl. per day.

Tests made on the charge and product from this operation have shown the yield of total aromatics to be 94.5 per cent of the aromatics present in the charge or producible from the naphthenes in the charge. This high yield has been maintained from the start of operation to date during the three periods of operation for aromatics production. Products from the reactor section are depentanized in the product stabilizer and then sent to the Udex unit charge tank.

Udex unit . . . The Udex unit is operated on a continuous basis charging the aromatic product from the Platforming unit. The charge is accumulated in floating-roof storage tanks to avoid contact with air. The charge rate is set to balance charge inventory and this rate to date has averaged 1,600 bbl. per day. The total hydrocarbon charge is introduced at a point approximately in the middle of the extractor.

The hydrocarbon rising in the extractor is contacted in countercurrent manner with a descending flow of solvent which contains diethylene glycol. The solvent in contact with the feed extracts the benzene, toluene, xylene, and whatever heavier aromatics may be present. The paraffinic hydrocarbons in the feed leave the top of the extractor as raffinate. This material is blended with the refinery gasoline product stream.

The rich solvent leaves the base of the extractor and is fed to the stripper where the aromatics are separated as a net product. The stripped solvent completes its cycle when it is returned to the top of the extractor. The aromatic extract from the stripper is next fed to a system of fractionation for separation into the individual benzene, toluene, xylene, and heavier aromatic fraction.

The fractionation of the total aromatic product into the individual aromatics, each meeting nitration-grade specifications, is carried out in a series of three fractionating columns each of which is equipped with special instrumentation to precisely control fractionation, thereby avoiding the need for any additional fractionation on the individual product streams. The properties of the individual aromatics as currently produced from the unit are shown in Table 1.

In the case of xylene, the petroleum-derived product in general has a gravity value either close to the specification value, or exceeds it as shown by the analysis in Table 1. This is an indication of greater purity, and probably shows somewhat greater orthoxylene concentration than is usual. The isomeric distribution of aromatics in the xylenes is as follows:

	Volume per cent
Toluene	—1
Paraxylene	18
Metaxylene	39
Orthoxylene	24
Ethylbenzene	19
Higher aromatics	Nil

General . . . The entire operation of the new facilities is controlled from a central control room equipped with a graphic panel depicting the flow through the successive units of the equipment. The graphic panel has a total of 64 compact strip-chart recording instruments for control of the integrated operation.

Because of difficulty which has been encountered in the past with water side fouling on hot service coolers, it was decided to use two air-cooled units in those services where difficulties with fouling would be expected to be troublesome. These units have given good service and their application has been well justified.

The operation of the facilities is now well integrated with the rest of the Cosden refinery which includes crude topping, fluid catalytic cracking, thermal cracking, and polymerization. The trend toward diversification of products which has been started may well be continued in the future. Many interesting possibilities presently exist as opportunities for supplying the continuously expanding demands of the new petrochemical industry.

SOCONY-VACUUM airplane is specially designed to meet needs of bush pilots for oil-field operations in western Canada. Skis enable plane to land almost anywhere, ferry in men and equipment.

BULLDOZER cut this road earlier but new snows have already narrowed it. Ribbons on pole in left foreground show geophone location.

Operation "Deep Freeze"

Low temperatures, rugged terrain make work in western Canada difficult; but winter is best time for activity

GEOPHYSICAL and drilling crews working the vast stretches of western Canada must overcome many severe obstacles during winter to carry on their search for oil.

Strange as it may seem, however, winter is the best time in which to carry out these operations—in spite of all the hardships caused by the snow, ice, and cold. This is because the muskeg is firm. In warm weather, it is an oozy mess, bogging men and equipment.

Not only are temperatures severe—sometimes they go to 70° below zero—but snow, ice, and some of the most rugged terrain in the Western Hemisphere team up to make the job more unpleasant.

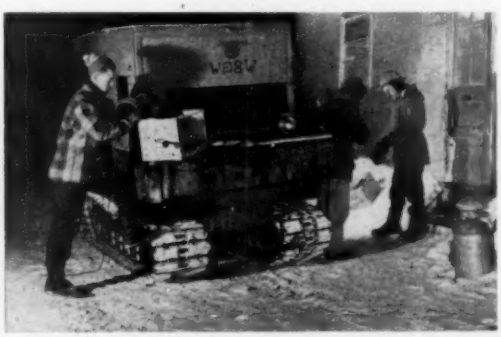
Transportation is a major problem in itself. In this big area a crew must depend on bush-type airplanes or the bulldozer to get to and from location. Since there are few rock outcrops to guide the geologist in western Canada, exploration in the region is largely geophysical.

Problems with equipment . . . Equipment used in this area during winter must have many modifications and special care. Metals, synthetic rubber, and plastics become brittle and tend to break in subzero cold. Diesel fuel freezes into a sluggish mass and pure ethylene glycol freezes to a firm jelly. Even the lightest-weight lubes freeze solid, and batteries are able to produce only a small portion of their rated power.

Much of the rolling stock has to be kept running 24 hours around the clock to prevent freezeups.

Bulldozer the mainstay . . . The bulldozer is the most important single piece of equipment used by the crews in winter. They depend on the 'dozer to precede all other surface movement, cut "roads," and keep them open. The bulldozer is also used as a prime mover for heavy equipment which does not have its own motive power. Skid-mounted trailer living quarters must be pulled by the 'dozer.

HUSKY DOGS carry a lot of freight in the frozen north. Pilot of airplane unloads supplies.



WEASEL, which moves on land, water, snow, or muskeg, is best answer to transportation problem.

TWO SOCONY crew members look over new motor-driven toboggan which can scoot across the snow at 40 m.p.h.

HIGH WIND catches geophone cable being reeled in after shooting. Natural-rubber hoses are best—they won't freeze.

Airplane useful . . . The airplane is used widely in Canadian operations. Planes ferry in nearly all men and supplies, and much of the equipment. While on the ground, engines of the planes are kept warm by being placed in tents, the plane pointing in "nose-first." Engine oil is diluted with gasoline, which is quickly consumed after the engine starts.

Addition of methyl alcohol to gasoline in the plane's tanks helps to keep fuel lines ice-free.

Other equipment . . . Trucks are serviced with a special Arctic gear oil that has a rated pour-point of 55° below zero. Various devices, including heating units, are required to keep water in radiator systems liquid.

Recording equipment for seismic shooting, either portable or truck-mounted, is protected by built-in propane heaters to prevent developer and fixer tanks from freezing. The seismic camera requires special low-temperature lubricants, and cables of natural rubber have proven more favorable than synthetic-rubber or plastic in extreme temperatures.

Dry-auger drills bring no particular cold-weather problems, but drills using mud have to be protected against freezing. Heat of the engine exhaust is utilized to keep kelly hose and mud pumps from freezing up. Slim-hole or core-drill rigs also require protection against freezing and are enclosed in a large canvas tent. Explosives used in seismic shooting—dynamite and nitramon, have proven to work satisfactorily even in subzero weather.

One company operating in western Canada, Socony-Vacuum Oil Co., Inc., uses jeeps, weasels (tracked vehicles a little bigger than jeeps which move on land or water), a half-track truck called the "Bombardier," motor-driven toboggans, tractors, and dog teams.

SEISMIC-CREW member prepares to set off dynamite charge. Weasel is at left.

DRILL IS SET UP to make another shot hole for a seismic crew. Socony-Vacuum uses various types of motorized equipment to negotiate snow and ice.

When you spin a globe you get a new and fresh viewpoint of the vastness of the petroleum industry's frontiers—and you get some idea of the problems involved in supplying equipment and engineering assistance at remote locations under all sorts of conditions.

For more than a half century the National Supply Company has been working at this business of providing a complete supply service wherever oil is produced in commercial quantities or major drilling operations are being carried out.

And this world wide petroleum industry supply service helps in another way—it keeps National's oil field equipment specialists in constant touch with operating problems whenever and wherever they occur. The day-by-day association, right at the wells, is a source of reliable information which guides the engineers who are responsible for the development of National Supply equipment to meet every drilling and production need.

The results of this integrated manufacturing and supply service will be on display at Tulsa in May. You'll see a whole array of new machinery and equipment with the familiar trademarks, "National," "Ideal," "Spang," and "Superior"—again at the same location and always in "National Blue."

THE NATIONAL SUPPLY COMPANY

PITTSBURGH 30, PENNSYLVANIA

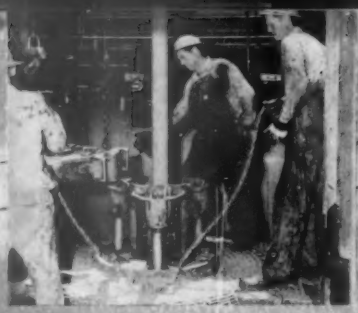
NATIONAL BLUE PRODUCTS

NEW PR

Ideal Multimatic Rotary Machine

Ideal Roller Kelly Bushing

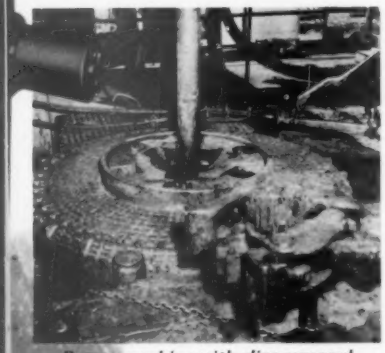
Roller Kelly Bushing in place and rotary operating



Slips retracted while drilling string is raised

ODUCTS

Slips set, supporting drill pipe



Rotary machine with slips removed

...anticipating the industry's needs for 66 years

Oilfield equipment has passed through many stages of development since 1887 when National Supply opened its first store. During the intervening 66 years, as a completely integrated manufacturing and distributing organization, National Supply has maintained a continuing program of research and equipment development aimed at keeping pace with the drilling and production machinery needs of the petroleum industry.

Among National's many recent contributions to more efficient drilling techniques is the "Ideal" Type 205 Multimatic Rotary. After two years of field tests in actual drilling operations this fast, safe, efficient rotary is now available with:

- Air-actuated drill pipe and casing slips with replaceable segments
- Fully-enclosed, built-in slip operating mechanism
- Direct-drive roller kelly bushing

Some of the features you'll find in the "Ideal" Multimatic Rotary include:

- Air operation of slips which makes easier work for the crew
- Faster slip action which permits quicker round trips and faster casing jobs
- Provides equal and balanced slip actuation, thus automatically centering drill pipe or casing
- Rotary handles both drill pipe and casing, with quick change-over from one to the other
- Casing can be set without removal of rotary machine which saves time and labor
- Control equipment permits quick adaptability of the rotary to any rig practice or procedure
- Roller kelly bushing driven directly from table thereby eliminating table master bushing

Other features and details are covered in the new bulletin now on the presses. Write for your copy.

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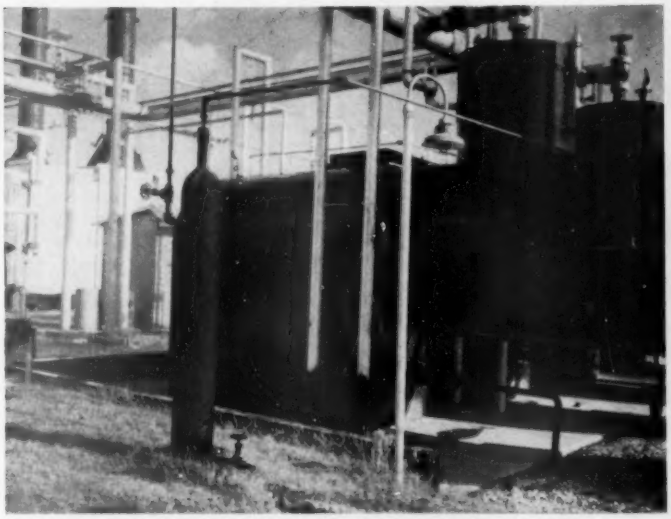

BLOWDOWN FROM BOILER passes through trap to remove sludge and sediment before entering the reboiler, at Sunray Oil Corp.'s gasoline plant near Elton, La.

EXCESS BLOWDOWN is removed through a back-pressure controller (see arrow) for disposal. See diagram at bottom of page for relative location of this controller (upper right-hand corner). Steam used in the reboilers for this setup at the Sunray gasoline plant is the exhaust steam from a 90-lb. turbine driving a lean-oil pump. This exhaust steam is admitted to the reboiler as needed.

Sunray uses boiler blowdown to neutralize condensate from its reboilers at Elton, La., plant

BOILER blowdown is used to neutralize condensate from reboilers at the Sunray Oil Corp. gasoline plant near Elton, La.

The continuous blowdown from the boilers has a pH value of 11.6. Condensate from the reboiler on the gasoline stabilizer and reboiler on the depropanizer has a pH value of 5.6 to 5.7, which is definitely on the acid side.

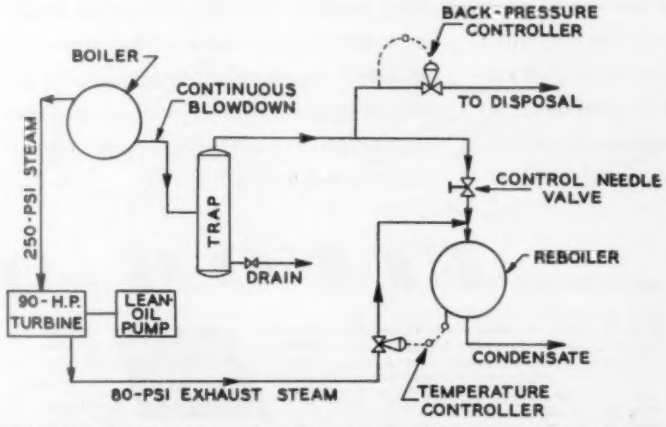

DIAGRAM OF SETUP to neutralize condensate from reboilers at Sunray's gasoline plant.

Tied to reboilers . . . As shown in the drawing, the blowdown stream has been tied into the reboilers to raise the pH value of the condensate from the reboilers up to 7.0 pH, which is the neutral point. This stops corrosion on the tubes in the reboilers and in the condensate-return lines.

Steam used in the reboilers is the exhaust steam from a 90-hp. turbine driving a lean-oil pump. This exhaust steam is admitted to the reboiler as needed by a temperature controller.

Passed through trap . . . Blowdown from the boiler is passed through a trap to remove sludge and sediment before entering the reboiler. The blowdown stream is hand-controlled into the reboiler by a needle valve. Excess blowdown is removed through a back-pressure controller for disposal (see arrow in photograph).

Employe's idea . . . This idea was conceived and put into operation by G. E. Boyd, plant superintendent.

Announcing the NEW improved . . .

The new improved FLUOR FIN-FAN HEAT EXCHANGER now comes equipped with *Transaire Sections,* offering heat transfer surface with many distinct advantages. Now for the first time the Fluor Fin-Fan is completely selected and supplied by Fluor. Write for Bulletin FF-8501R.

The design features of Transaire Sections appreciably hold velocity pressure loss to a minimum, provide smoother flow into and from tubes with a reduction in turbulence, increase cooling capacity at lower horsepower, increase the safety factor, and offer desirable features unobtainable in other air-cooled heat exchangers of conventional design.

The Fluor "truss-type" steel structure remains essentially the same. The plenum design, the trouble-free performance of Fluor mechanical equipment, the uniform prefabrication of parts, the adaptability to almost any new duty involving pressures to 5,000 p.s.i. and temperatures to 1,500°F—these have been retained.

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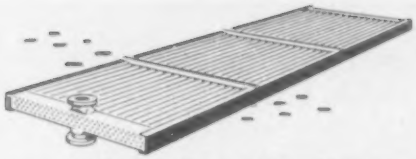
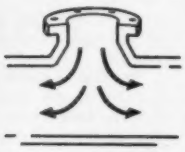
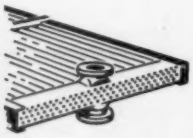


Transaire Sections offer these advantages:



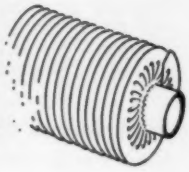
1. Less pressure drop

Inlet and outlet nozzles in the header-manifold allow for a full pipe cross sectional area opening into the header with curved entrance to keep velocity pressure loss at a minimum. Note how the nozzle widens out below the inlet flange permitting a smoother, more natural flow into the header. Tube holes are taper countersunk for the same reason.



2. Four-to-one safety factor

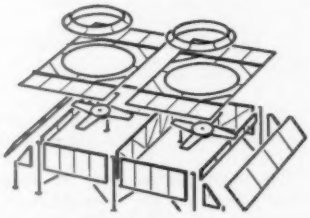
Headers are either cast iron or fabricated steel and in either case are *unconditionally guaranteed* to withstand test pressures of four times the design pressure. Brass header plugs provide quick easy access to tube ends for cleaning or replacement without requiring special tools.



3. More heat transfer surface

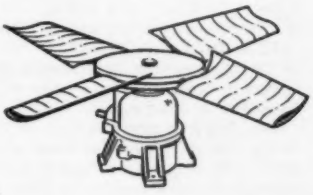
Fins are crimped, and crimped fins present more surface area to tubes which in turn means more metal-to-metal contact and greater dissipation of heat. The crimp also presents more fin surface to passing air. Tubes are available either in admiralty, steel or other materials as required. Fins of copper or aluminum.

Fluor Structures provide these advantages:



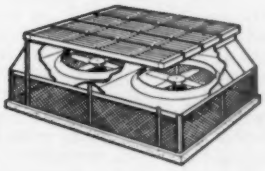
1. Rigidity of steel

The entire steel structure is conservatively designed with "truss-type" construction. All parts are prefabricated to size to fit all units which greatly facilitates field erection work. Fluor's wide experience as designers and constructors of plants and equipment for industry insures proper application and successful operation of every Fin-Fan installation.



2. Mechanical excellence

Mechanical equipment for Fluor Fin-Fans is built to withstand the most rigorous heat transfer requirements. 4 basic gear units cover 4 different and distinct horsepower ranges. This, coupled with a choice of fan assemblies ranging up to 20' diameter with 2, 3, 4 or 6 blades per fan unit, enables the proper combination of gears and fans for maximum efficiency.



3. Meet space requirements

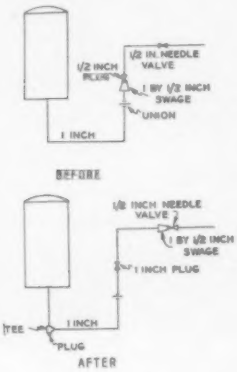
Fluor Fin-Fans are adaptable to available space. They may be connected in series for long temperature ranges, or in parallel for large capacities. Single units can be used for multiple duties in widely diversified applications economically and at low maintenance costs. Parts are simple and standardized to save erection time in the field.

Well Drips Improved

Changes in piping make it simple to unstop lines

SLIGHT modifications to well-sample drip piping makes it a simple task to unstop lines when difficulties occur.

Under the original conditions, the sample drips had a 1-in. line coming



out of the bottoms, the line having a union connection followed by a 1 to ½-in. swage. A ½-in. plug valve would be connected to the reduced end of the swage and this would be followed by ½-in. piping and a ½-in. needle valve.

Stoppage occurred below the ½-in. plug valve and it would become necessary to shut in the well and bleed off the flow line to clear up the trouble. Such a task would require the services of a field gang for a couple of hours.

Changes . . . Changes which were made by Rudolf Kankel of Humble Oil & Refining Co., Katy, Tex., to improve the system required: (1) The installation of a tee in place of an ell immediately below the drip; (2) replacing the ½-in. plug valve with a larger 1-in. valve, and the rearrangement of piping so that 1 to ½-in. swage immediately preceded the ½-in. needle valve.

By having a plug in the bottom end of the tee, it will be possible to unstop the connection in a matter of minutes, with a minimum of well downtime. In addition the operation may be handled by one man rather than a gang.

A further insurance against stoppage is the 1-in. plug valve with only a slight chance that the line will stop upstream of this valve.

Catalyst Unloading Is Made Easy, More Economical

A more-economical method of unloading catalyst from railroad cars is being employed at Cities Service Refining Corp.'s Lake Charles, La., refinery.

The modified method called for the relocation of the intake line to the unloading hopper, and the removal of catalyst bags and the star feeder valve in the upper section of the unloading hopper.

Suction is applied to the uppermost section of the unloading hopper and catalyst enters through a manhole near the top of the storage section of the unloading hopper rather than through the uppermost section.

Heavy catalyst particles leave the air stream in the disengaging space in the unloading hopper. Some of the finer particles are carried over through the blower and are retrieved in the fresh catalyst hopper where the blower is discharged.

The original installation experienced considerable down time for repairs to the bags and mechanics. This revised method is not any faster than the original unloading procedure, but provides considerable more unloading time due to greatly decreased down time for repairs.

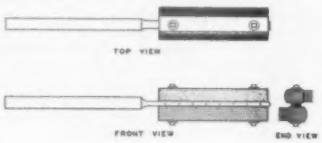
The only repairs now necessary are infrequent adjustments on the exhauster.

Wire Brushes Adapted for Cleaning Exchange Tubes

Wire brushes have been adapted to effectively clean 3-in. exchange tubes at one plant.

First the brush handles were sawed off; then a piece of ⅜-in. pipe was slightly flattened for a distance of 8 ft., for attaching to the brushes. Then 3/32-in. holes were drilled 1-in. apart in the round edge of the flattened pipe section in order to make a spray when hooked to a water supply.

One brush turns with the bristles facing one way, and the other brush turns with the bristles, facing in the opposite direction, with the flattened pipe between. The entire assembly is bolted together. Water pressure of 35 psi., connected to the pipe, works the brushes in a circular motion through the exchange tube.



The assembly can be made to fit tubes from 2½ to 3¼-in.

Compressor Lubricators Can Now Be Vented More Easily

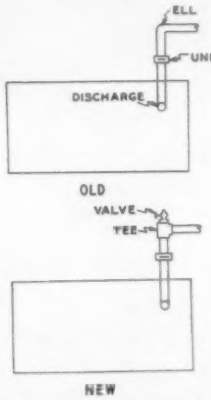
On early models of lubricating pumps used with compressors, the venting of air from the pumping unit can be a difficult job.

To simplify the task, a bleeder may be easily installed for removing air from the pumping unit, which removal must be accomplished before the pump can operate satisfactorily.

Air may enter the pump in two ways: (1) Leakage through various fittings; and (2) through the oil reservoir should the level drop too low.

In order to prime the original units, the union on the discharge line would be broken and all air removed. This union is located next to the reservoir and is difficult to reach since each reservoir has 10 pumps, 10 sight glasses, and 10 discharge lines on about 2-in. centers.

Removing the union is a difficult task and frequently sight glasses may



be broken. In some cases the entire pump must be replaced when the glass is broken.

In modifying the unit, the ell normally used on the discharge lines is removed and a tee installed with ⅛-in. bronze valve in the open end. This valve may be easily reached and it is simply a matter of turning the valve whenever bleeding of the unit is desired.

The method was suggested by Earl W. Hood, filter and compressor man for Humble Oil & Refining Co., Baytown, Tex.

THE CENTRIFUGAL COMPRESSOR—5

More on Station Operation

by C. F. Koenig, III*

OPERATING characteristics for a four-unit centrifugal compressor station were presented in the preceding installment *(The Oil and Gas Journal, January 26, 1952)*. This took the form of a plot of the flow in million standard cubic feet per day versus station discharge and suction pressure, per cent speed, and horsepower.

Fig. 1 shows a different method of presentation which takes into account the effect of the discharge pressure of the preceding station on the flow. Curves which show the suction pressure and horsepower at different speeds and flows are drawn for a constant discharge pressure of the station under consideration. Several such curves are then drawn to cover the normal range of discharge pressure in reasonable increments. Lines of flow vs. suction pressure as it is affected by the discharge pressure of the preceding station are then superposed. Fig. 1 shows three such curves prepared for 100-psi. increments in discharge pressure. This type of presentation shows very clearly the relation of the output of the previous station to load in the station being considered.

*De Laval Steam Turbine Co. From paper presented at A.S.M.E. meeting, Kansas City, Mo., 1952.

Development . . . The pace of centrifugal - pipe - line - compressor development has been swift and continues to exercise the ingenuity of the compressor designer. The latest development has been the high-specific-speed impeller. This is a so-called "mixed-flow" impeller which is intended for operation with high-speed gas-turbine drivers on large pipe lines where the compressor must pass very high volumes but deliver relatively low heads. The design of this impeller is based on forced-vortex principles and the blading is machined from a solid forging by three-dimensional milling in order to obtain optimum shapes for high performance.

Steam-driven . . . A three - unit, steam - turbine - driven centrifugal compressor station, the first such station to be put in operation, is the Transcontinental Natural Gas Pipeline Co.'s Station No. 7 at Tylertown, Miss. These units operate normally at 4,500 r.p.m. and are each rated at 4,880 hp. The three compressors are designed to move 603 million standard cubic feet per day through a pressure ratio of 1.585.

Centrifugal compressors have thus far been considered principally for use in large pipe lines where the gas flow is 300 million standard cubic feet per day or higher. The high-specific-speed impeller mentioned above is a major development for pipe lines which carry 1 billion or more standard cubic feet of gas per day. On the other end of the scale, thinking is now turning toward small-flow pipe lines and feeder lines where a single-stage centrifugal compressor will not usually deliver a high enough pressure ratio or absorb enough power to make its use attractive. The solution here seems to be multistage compressors, and such machines are being seriously considered.

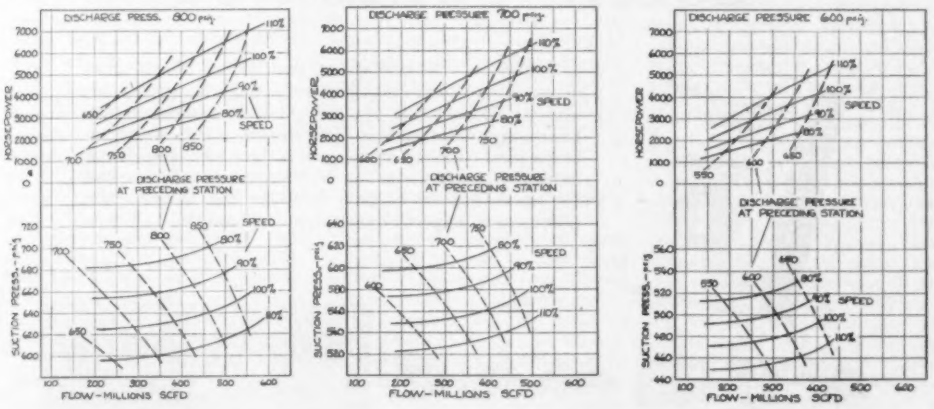


Fig. 1—Showing centrifugal compressor station operation at discharge pressures of 600, 700, and 800 psig.

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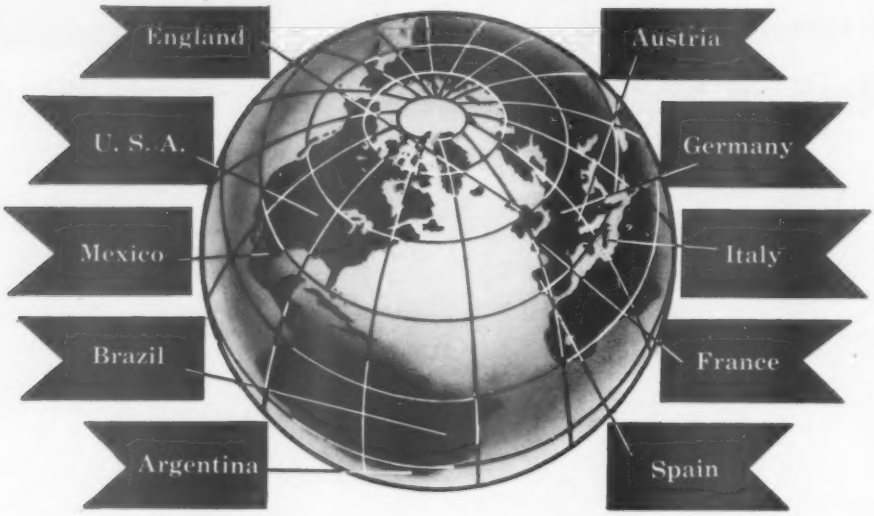

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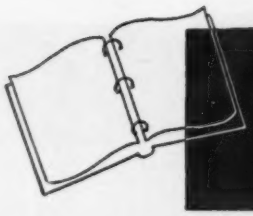
ALLOY STEELS FOR OIL REFINING—1



REFINER'S NOTEBOOK

Alloy-Steel Development*

The American Petroleum Institute appointed an Interim Advisory Committee on Alloy Steels in 1951. This committee was appointed pending the organization of an industry advisory committee by or for Petroleum Administration for Defense. Members of the committee include representatives of steel and equipment companies as well as the oil companies. The committee has made some specific recommendations involving conservation of nickel and molybdenum in ferritic alloy steels used in oil refineries for both high-temperature and low-temperature service.

SPECIFIC recommendations, to be presented later in the Refiner's Notebook, largely apply to ferritic alloy steels used primarily in pipe, tubing, cast and forged valves, fittings, and accessary equipment. In addition, austenitic and other nickel alloys are necessary in petroleum refining where straight chromium steels are impractical because of high temperature, corrosion by naphthenic or other organic acids, and attack by some chemicals, such as phenol, phosphoric acid, etc., used in treating or catalytically.

With the advent of high-temperature, high-pressure chemical processing, such as oil cracking, about 25 years ago, alloy steels were developed for this special service. The commodities most affected are the classes of tubular products, as represented by steam and oil piping, boiler, superheater and still tubes, heat-exchanger and condenser tubes, and related components such as valves, fittings, etc.

Specifications governing these products are now as old as 25 years, and very few are less than 10 years of age, for the reason that it takes such a period of time to run sufficient (not complete) high-temperature tests and to gain fabricating and service experience in order to justify promulgation of an engineering standard.

"Creep" . . . Although the original high-temperature testing technique consisted of performing a conventional tensile test on a heated sample, it quickly developed that time under load was of major significance, and the technique was changed to measure "creep" (extension, with time, under load). This was later supplemented by the determination of "stress rupture" (load causing fracture on termination of a specified time period).

With more insight gained in the performance of metals at elevated temperatures, it became necessary to conduct simultaneous studies of structural stability. Specific alloying additions were made to prevent or retard graphitization, temper-embrittlement, spheroidization, intergranular attack, and other reactions which tend to accelerate failure.

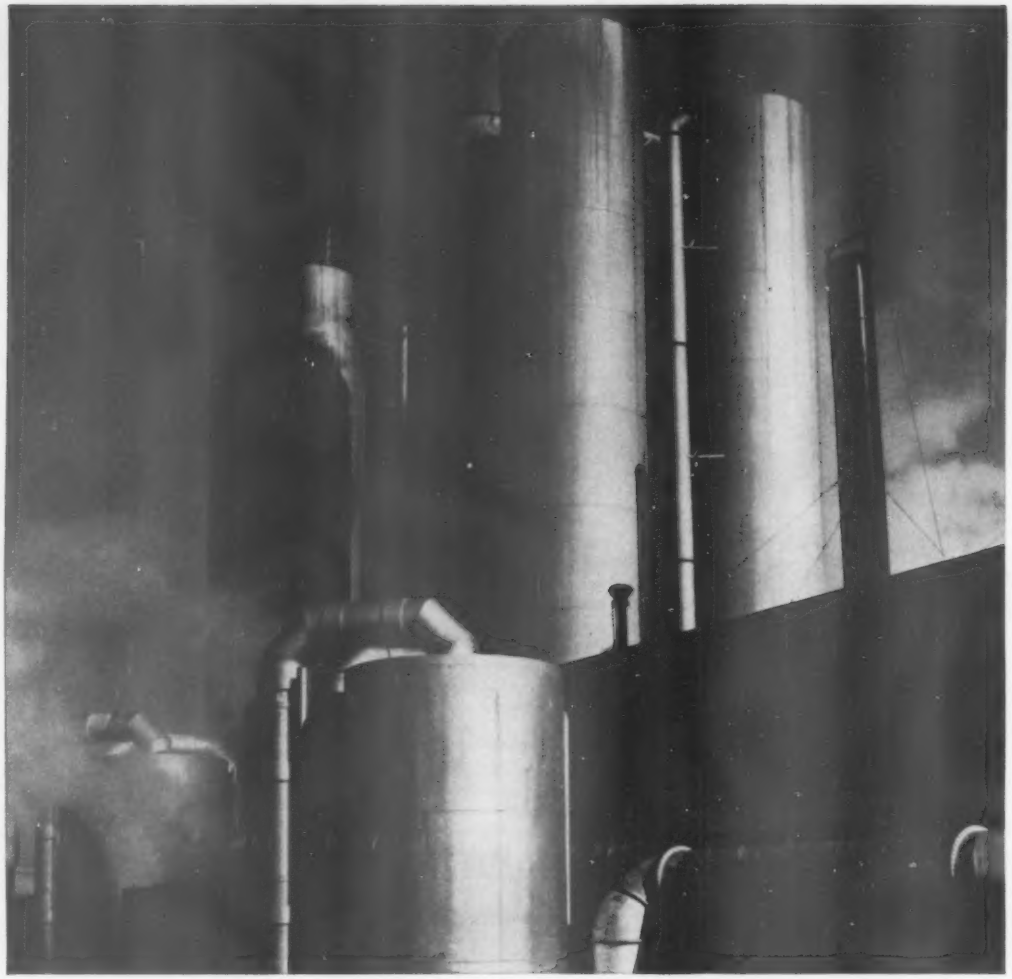
The time-reference criterion now generally accepted for evaluating materials is 100,000 hours or approximately 11 years. For this purpose, it is not considered good engineering practice to extrapolate experimental data from very short-time intervals, so it is customary to run exploratory tests beyond 10,000 hours (about 1 year) in order to extrapolate to the 100,000 hours' datum.

Alloy development . . . Processing oil at temperatures of about 550° F. and upwards, especially with sour crudes, led to tube wastage from corrosion at exorbitant rates. Consequently, in the early twenties the refining industry and the still-tube manufacturers engaged in an experimental program to develop steels suitable for these severe service conditions. It was found that chromium was the most effective alloying element to impart the necessary corrosion and oxidation resistance to steel. Experiments in actual operations were conducted on steels whose chromium content varied from 1 per cent up through 13 per cent, and also on the austenitic stainless (chromium-nickel) steels. However, these early straight chromium steels were found to be unsuitable in one respect. When the furnace was shut down, the tubes were found to be embrittled to the extent that they shattered on handling.

Moly steel . . . The phenomenon of temper embrittlement was recognized from experience in other applications and subsequently remedied in some straight chromium steels by the addition of about 0.5 per cent molybdenum. Tests to determine high-temperature strength or resistance to creep also have established the potency of molybdenum for this purpose. Molybdenum is practically unique in its contribution to the high-temperature strength of ferrous materials. These benefits do not accrue beyond the addition of about 1.5 per cent molybdenum, so the standard ferritic alloys have been developed with either 0.5 per cent or 1.0 per cent molybdenum. Molybdenum is added in the austenitic stainless alloys, Types 316 and 317, in amounts of 2 to 4 per cent. While this addition has been made primarily for improved resistance to aqueous corrosion, the molybdenum has been found to increase resistance to creep or stress-rupture at elevated temperatures.

Alloy series . . . The success of the 5 per cent chromium alloy in resisting corrosion by hot oil led to the development of a series of alloys containing variations of aluminum, boron, columbium, manganese, molybdenum, silicon, titanium, vanadium and zirconiun in ferritic steels with chromium up to about 10 per cent. These researches established that molybdenum and, in more restricted degree, vanadium are most effective in increasing high-temperature strength. Vanadium additions, unfortunately, are of no benefit in combating the problem of temper-embrittlement.

*From report by the A.P.I. Interim Advisory Committee on Alloy Steels, 1952.



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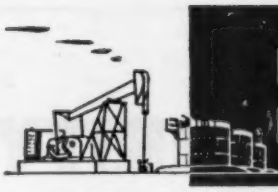
ALUMINUM COMPANY OF AMERICA

by
Ralph F. Nielsen*



ENGINEERING FUNDAMENTALS

Equation of State Applications—One-Component Systems

IN the previous installment of this series several equations of state were mentioned. These equations serve to correlate the P.V.T. work on hydrocarbon and other systems and to predict certain properties from other (measured) properties. The equations generally give P as a polynomial in 1/V, where V is the molal volume, or, more simply, in d, where d is the number of mols per unit volume:

$$P = RTd + Bd^2 + Cd^3 + Dd^4 \ldots \quad (1)$$

One of the most widely used equations is that of Beattie and Bridgman:

$$P = RTd + (B_oRT - A_o - Rc/T^2)\,d^2 + (-B_obRT + A_oa - RB_oc/T^2)\,d^3 + (RB_obc/T^2)\,d^4 \quad (2)$$

A still more accurate equation is that of Benedict, Webb, and Rubin:

$$P = RTd + (B_oRT - A_o - C_o/T^2)\,d^2 + \left[bRT - a + \frac{c(1+\gamma d^2)\exp(-\gamma d^2)}{T^2}\right] \times d^3 + a\alpha d^6 \quad (3)$$

It is seen that the terms in the coefficients are constants or constants multiplied by T or by $1/T^2$, except for the exponential term in the Benedict equation. In the Beattie and Bridgman equation the occurrence of the product of two or more constants, such as Rc, serves to limit the total number of constants to be determined. In the Benedict equation no such purpose is served, but in calculations or rearrangements the inclusion of R as a coefficient of T is advantageous. The classical equation of van de Waals:

$$P = \frac{RT}{V-b} - \frac{a}{V^2} \quad (4)$$

cannot be put in the form of Equation 1 because of the denominator V — b.

A mentioned previously, van der Waals' equation gives straight lines for the isometrics, or lines of constant V or d, whereas actually they are slightly curved at high pressures. The other two equations give the equation of the isometrics as:

$$P = Tf_1(d) - f_2(d) - (1/T^2)\,f_3(d) \quad (5)$$

the $1/T^2$ term serving to give some curvature. The functions of d are constants for any one isometric. In the Beattie-Bridgman equation they are all positive. In the Benedict equation the exponential term increases agreement with experiment and also reverses the curvature when this term predominates.

The trends in the compressibility factor Z (= PV/RT) may be shown from the equations of state. For simplicity, van der Waals' equation will be used. Below a certain temperature, called the Boyle temperature, the Z curves show a minimum (Fig. 1). This may be found by setting the derivative equal to zero. Multiplying Equation 4 by V and differentiating:

$$\frac{d(PV)}{dP} = \left[\frac{RT}{V-b} - \frac{RTV}{(V-b)^2} + \frac{a}{V^2}\right] \times dV/dP = 0 \quad (6)$$

or

$$RT = \frac{a}{b}\left(\frac{V-b}{V}\right)^2 \quad (7)$$

from which V and, subsequently, P may be calculated for the minimum in Z. At the Boyle temperature the slope is zero at P = 0, or, setting V = ∞ in Equation 7, the Boyle temperature is a/Rb. At the critical point the isotherm is horizontal (see last number of this series) or dP/dV = 0, that is, dZ/dP is infinite, as shown at C in the figure. The condition that the isotherm have a horizontal point of inflection is, from calculus, that the first and second derivatives of P with respect to V must be zero:

$$\frac{RT}{(V-b)^2} = \frac{2a}{V^3} \quad (8)$$

$$\frac{2RT}{(V-b)^3} = \frac{6a}{V^4} \quad (9)$$

Dividing one equation by the other, for the critical point:

$$V_c = 3b \quad (10)$$

whence:

$$T_c = \frac{8a}{27Rb} \quad (11)$$

$$P_c = \frac{a}{27b^2} \quad (12)$$

The critical density as calculated is 30/(22,400 × 0.008544) = 0.16 gm. per cc. as compared with 0.21 given in the table of critical data. Critical temperature and pressure agree with experimental values.

One of the chief uses of equations of state is the prediction of properties not measured directly. This is illustrated by the calculation of the change in temperature on free expansion, the Joule-Thomson effect. From the usual mathematical techniques of thermodynamics this is given by:

$$(\partial T/\partial P)_H = \frac{T(\partial V/\partial T)_P - V}{C_p} \quad (13)$$

The value of dV/dT at constant pressure is obtained from the equation of state but C_p, the heat capacity at constant pressure, must be known.

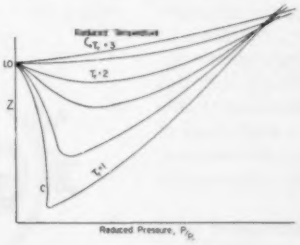


FIG. 1—Compressibility factor as a function of pressure and temperature.

Reference

1. Data from Handbook of Chemistry and Physics, The Chemical Rubber Co.

*Associate professor, petroleum and natural-gas engineering, Pennsylvania State College.

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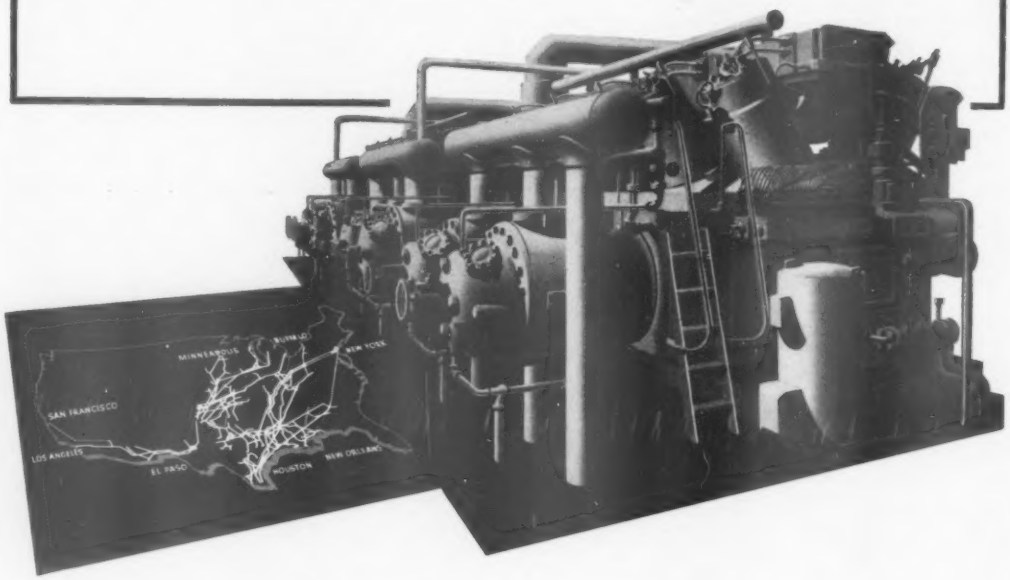

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GULF INDUSTRIAL LUBRICATION

by W. L. Nelson
Technical Editor

PROGRESS IN METALS

Stainless Steels in Petroleum Refining (Oxidation Resistance)

STAINLESSNESS, in the sense of maintenance of a clean, polished appearance, first becomes evident when the chromium content of a steel or iron exceeds 12-14 per cent chromium. Additional resistance to oxidation or rusting is evident in the higher chromium (12 to 25 per cent) content steels. Although the 4-6 per cent chromium steels are not truly stainless, they are included by the American Iron and Steel Institute (A.I.S.I.) among its 500 Series Wrought Stainless Steels.

The steels used most widely in the refining industry are shown in Table 1 arranged by their A.I.S.I. type numbers. Although the 400 Series plain chromium steels (Types 405 and 410 are illustrated) exhibit an excellent resistance to oxidation, the carbide in these steels tends to migrate to the grain boundaries upon long exposure at high temperatures. Thus, altogether unexpected and terrible failures sometimes occur. This behavior is related in part to the fact that these steels are used in the austenitic hardened (quenched) condition whereas their normal constitution is that of martensite. The common 4-6 variety of steel does not ordinarily suffer from difficulties with embrittlement because it is used in the ferritic or martensitic condition.

One method of alleviating the tendency toward embrittlement is the use of very small amounts of carbon—usually under 0.08 per cent. Such chromium alloys are sometimes called chromium irons rather than steels. A low carbon content is helpful but even greater stability is attained by the use of nickel. The amount of nickel required is related to the chromium content. Thus, as 18 per cent chromium steel needs about 8 per cent of nickel to attain stability whereas a 25 per cent chromium steel requires 10 or 12 per cent nickel and even 20 per cent nickel is found to be helpful. Large amounts of nickel are not useful in the steels used for most refinery services, not only because nickel is very expensive but because both sulfur dioxide and hydrogen sulfide corrode the high-nickel steels.

Although nickel is useful in stabilizing the carbides, the use of small amounts of titanium (5 times per cent C) or columbium (10 times per cent C) as in the "stabilized" Type 321 and 347 steels, is also helpful.

Molybdenum, as in Types 316 and 317, increases the high-temperature strength or resistance to "creep" and under certain conditions improves the resistance to corrosion.

Most of these steels (at least Types 304, 316, 317, 405, 410, and 430) can be obtained in the form of clad plate and this materially reduces their cost.

The effect of chromium content on the resistance to oxidation is somewhat as follows (relative to plain carbon steel):

	Relative attack	Range	Relative cost* (approx.)
Carbon steel	100	100	1.0
Chromium:			
2 per cent	67	(36-78)	2.1
5 per cent	38	(14-57)	3.4
8 per cent	9	(9-33)	6.0
12 per cent	8	(2-30)	7.5
18 per cent	2	(1-6)	11.0
22-25 per cent	1	(0-4)	16.0

*Solid—not clad plate.

The tabulation is based on a large variety of operating conditions and temperatures and although wide variations are evident, the tabulation shows conclusively that the use of chromium steels is economical at percentages of 5 or 8 per cent or higher if severe oxidation occurs.

The actual extent of oxidation cannot be stated with such assurance, but most authorities agree that losses by oxidation will be very small during long exposures at the following temperatures:

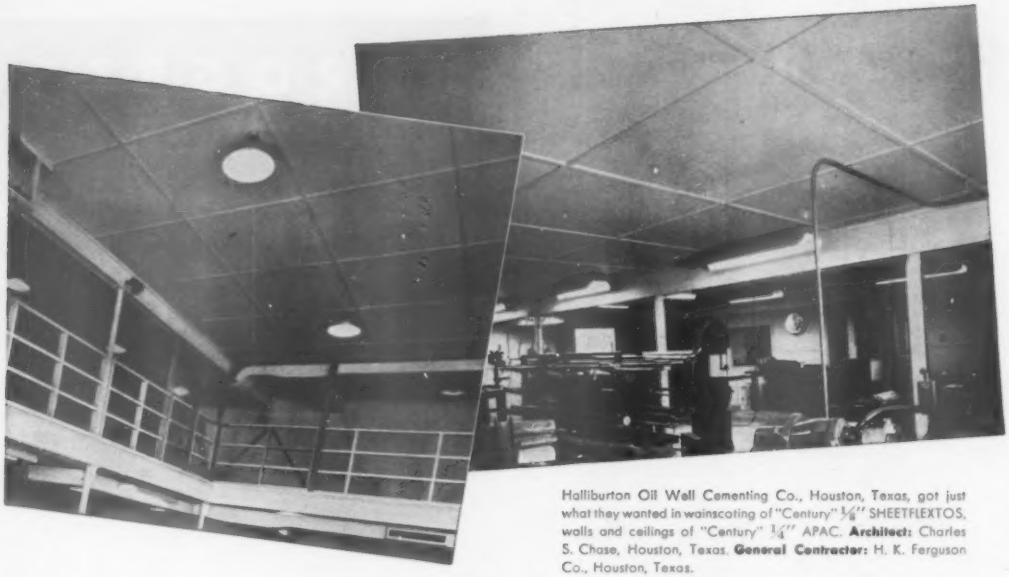
	°F.
Carbon steel	950
Chromium:	
2 per cent	1,050
5 per cent	1,100
8 per cent	1,200
12 per cent	1,300
18 per cent	1,600
22 per cent	1,800
25 per cent	2,000

There are, of course, many other considerations in the selection of stainless steels such as their resistance to "sulfide" or other corrosive agents, and their somewhat greater strength at high temperatures.

TABLE 1—CHEMICAL COMPOSITIONS* OF THE WROUGHT STAINLESS STEELS USED MOST WIDELY IN THE PETROLEUM REFINING INDUSTRY

Type A.I.S.I.†	Chromium	Nickel	Carbon	Manganese (max.)	Silicon (max.)	Other elements
Austenitic—not hardenable:						
302 (18-8)	17-19	7-10	0.08-0.2	2.00	1.00	.....
304 (18-8)	18-20	8-11	0.08	2.00	1.00	.....
309 (22-12)	22-24	12-15	0.20	2.00	1.00	.....
310 (25-20)	24-26	19-22	0.25	2.00	1.50	.....
316 (18-8-3)	16-18	10-14	0.10	2.00	1.00	Mo 2.00-3.00
317 (18-8-3)	18-20	11-14	0.10	2.00	1.00	Mo 3.00-4.00
321 (18-8) Ti	17-19	8-11	0.08	2.00	1.00	Ti min 5 x C
347 (18-8) Cb	17-19	9-12	0.08	2.00	1.00	Cb min 10 x C
Martensite—hardenable:						
405 (11-13)	11.5-13.5	.....	0.08	1.00	1.00	Al 0.10-0.30
410 (11-13)	11.5-13.5	.....	0.15	1.00	1.00	.....
Ferritic—not hardenable:						
502 (4-6)	4-6	.....	0.10	1.00	1.00	.....

*For all steels, maximum phosphorus is 0.04 per cent, and maximum sulfur is 0.03 per cent. †S.A.E. numbers of most of these steels end in the same three numbers, as A.I.S.I. 302 is S.A.E. 30302 and A.I.S.I. 410 is S.A.E. 51410.



Halliburton Oil Well Cementing Co., Houston, Texas, got just what they wanted in wainscoting of "Century" 1/8" SHEETFLEXTOS, walls and ceilings of "Century" 1/4" APAC. **Architect:** Charles S. Chase, Houston, Texas. **General Contractor:** H. K. Ferguson Co., Houston, Texas.

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. . . ceiling without overhead

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Fire-resistance, of course, is an outstanding feature of these structural boards, combined as they are of virtually indestructible asbestos fiber and portland cement. Ease of cleaning, too, comes "naturally" to their hard, smoothly-textured surfaces that can't be hurt by water, dampness, or rot, and need no protective painting.

But look at the *extra* features that go with "Century" APAC and SHEETFLEXTOS. Both Sheets are also resistant to rodents, immune to termites. They go on fast, in big sheets (standard 4′ x 8′) that can be cut or drilled on the job, and fastened easily with screws or ring-fettered nails. They obviate the need for laths and plaster, and, while they require no painting at all, they take decorative colors well. SHEETFLEXTOS, as its name implies, has the added advantage of flexibility, to make curves and domes where indicated.

Both "Century" APAC and "Century" SHEET-FLEXTOS make good surroundings for successful work and enjoyable living. Figure on one or both for your attractive, fire-resistant interiors. Write us for further details about these economical products . . . and name of your nearest distributor.

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Electrical Measurement of Corrosion Rate

A RECENT laboratory study by the National Bureau of Standards proves for the first time that the rate of weight loss of a piece of steel corroding normally in soil can be measured electrically, without actually weighing the metal. Conducted by W. J. Schwerdtfeger and O. N. McDorman, of the NBS corrosion laboratory, the study gives further evidence that the electrochemical theory of corrosion applies generally to soils. The work suggests valuable practical applications, such as determination of the corrosion rate of a tank or other underground structure without the need for visual inspection.

When iron or steel is exposed to the soil, local differences in electrical potential develop at the surface of the metal, resulting in the formation of numerous small corrosion cells. This means that electric currents flow through the soil from certain areas (anodes) to areas of less negative potential (cathodes), with accompanying discharge of hydrogen ions at the cathodes and loss of metal from the anodes. By Faraday's law, the rate of weight loss from corrosion is proportional to the current.

How it works . . . The NBS-demonstrated measuring technique is based on the relation that the current in a corrosion cell can be expressed in terms of the values of anodically and cathodically (positively and negatively) applied direct current, from an external source, that will just reduce the cell current (corrosion current) to zero. The relation is

$$i_c = \frac{I_p \quad I_a}{I_p + I_a},$$

where

i_c = the corrosion current, I_p and I_a = , respectively, the cathodically and anodically applied currents required to reduce the corrosion current to zero. As increments of current are applied, the potential of the cell changes. When the measured potentials are plotted against the applied currents, a change in the slope of the curves usually marks the points (I_p and I_a) at which the applied currents have reduced the local corrosion current to zero.

When a single piece of metal is exposed to a corrosive medium, it is impossible to measure the corrosion current directly. The corrosion current, made up of innumerable small cell currents, must be determined indirectly from changes in slope of the current-potential (polarization) curves. The NBS study demonstrates for the first time that the total corrosion current i_c — and thus the weight loss—of a single piece of metal normally corroding in soils, can be determined by the equation, from values of I_p and I_a obtained from the changes in slope of the cathodic and anodic polarization curves.

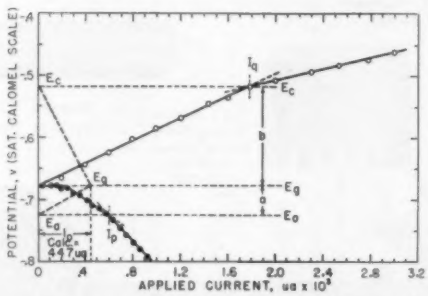

Fig. 1—Polarization curves of a steel electrode exposed to Soil 60. Open circles anodic, closed circles cathodic.

In establishing the feasibility of the indirect measuring technique, weighted steel specimens, differentially aerated, were exposed at the bureau to five corrosive soils for approximately 2 months. The soils ranged in reaction from very acid (pH 2.9) to very alkaline (pH 9.6). Because of the possibility of changes in rates of corrosion during the 2-month period, polarization curves were obtained at intervals throughout the exposure period. At the end of this period the specimens were removed from the soils, cleaned, and reweighed. Actual weight losses were compared with weight losses calculated indirectly by Faraday's law, using values of corrosion current (i_c) obtained from the equation on the basis of values of I_p and I_a indicated by changes of slope in the polarization curves. The calculated values of weight loss differed on the average from the actual values by approximately 4 per cent.

Applications . . . This technique for indirect electrical measurement of corrosion rate appears to have possibilities for extensive application both in the laboratory and in the field. In laboratory determinations of the corrosion rate of certain materials, for instance, the weight loss resulting from corrosion might actually be exceeded by the cleaning error. The electrical method makes possible much more accurate comparisons of the corrodibilities of such materials. In the field actual weighing or inspection of an object that has been buried for years will indicate how much total corrosion has occurred, but will not show how rapidly, if at all, it has been corroding just prior to inspection. The electrical method, on the other hand, measures the present corrosion rate, which is likely to be of greater practical interest than the history of past corrosion. Furthermore, the electrical method does not involve the removal of corrosion products, which often inhibit corrosion.

Note: For further technical details, see "Measurement of the Corrosion Rate of a Metal from its Polarizing Characteristics," by W. J. Schwerdtfeger and O. N. McDorman, J. Electrochem. Soc. 99, 407 (October 1952).

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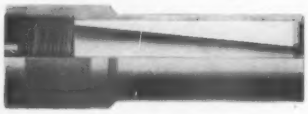

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Ceramic lined UBOT Flow Choke

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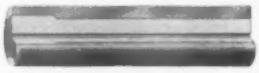

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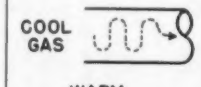
h_f HEAT TRANSFER

COEFFICIENT of HEAT TRANSFER through FILM between INSIDE of WARM TUBE and COOL GAS

Tube Position: Horizontal

Gas Movement: Turbulent



EQUATION:

$$h_f = 0.0225 \frac{K}{D}\left[\frac{DV\rho}{\mu}\right]^{0.8}\left[\frac{C\mu}{K}\right]^{0.4}$$

TERMINOLOGY:

h_f - Film coefficient of heat transfer, BTU/hr. sq. ft. °F.

K - Thermal conductivity of gas, BTU/hr. ft.^{2} °F./ft.

D - Inside diameter of tube, ft.

V - Velocity of gas, ft./hr.

ρ - Density of gas, lbs./ft.^{3}

μ - Absolute viscosity of gas, lbs./hr. ft.

C - Specific heat of gas, BTU/lb.°F.

LIMITATIONS:

Reynolds Number ($DV\rho/\mu$) must be over 2100.

SIMPLIFIED EQUATION:

Assuming a value of 0.78 for ($C\mu/K$) which is an average value for many gases and since the viscosities of many gases do not vary widely, the following simplied equation may be obtained.

$$h_f = 0.0144 \frac{C(V\rho)^{0.8}}{D^{0.2}}$$

PHYSICAL CONSTANTS: The values of the physical constants such as density, viscosity and others are reported in the International Critical Tables, in several handbooks, and in the technical literature.

Page references in the Chemical Engineers' Handbook, J. H. Perry (1948) are as follows:

for ρ -- see pp. 130-148, 175-195, 1583.
μ -- see pp. 370-374, 1198, 1696.
K -- see pp. 459-461, 1303, 1697.
C -- see pp. 225-236, 297, 1588, 1696.

REFERENCES:

1. Introduction to Heat Transfer, Brown and Marco, p. 91.
2. E. N. Sieder and G. E. Tate, Ind. Eng. Chem., 28, 1429-1435 (1936).
3. Process Heat Transfer, Donald Q. Kern, p. 103.
4. Elements of Heat Transfer and Insulation, 2nd Edition, Jakob and Hawkins, p. 114.

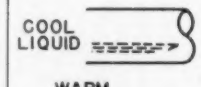
P 4 c

COEFFICIENT of HEAT TRANSFER through FILM between INSIDE SURFACE of a WARM TUBE and a COOL LIQUID

Tube Position: Horizontal

Liquid Movement: Streamline

Special Consideration: Liquids of low viscosity.



EQUATION:

$$h_f = 1.62 \frac{K}{D}\left[(1+0.015 Z^{\frac{1}{3}})\right]\left[\frac{\mu}{\mu_f}\right]^{\frac{1}{3}}\left[\frac{4wC}{\pi KL}\right]^{\frac{1}{3}}$$

where $Z = \left[\frac{D^3\rho^2\beta}{\mu_f^2}\Delta t g\right]$

TERMINOLOGY:

h_f - Heat transfer coefficient, BTU/hr. sq. ft. °F.

k - Thermal conductivity, BTU/hr. sq. ft. °F./ft.

D - Diameter of tube, in feet.

μ - Viscosity at bulk temperature of the stream, lb./hr. ft.; μ_f is evaluated at t_f, μ_s at t_s.

w - Mass Rate of flow, lbs./hr.

C - Specific heat at constant pressure, BTU/lb.°F.

L - Heated length of pipe, in feet.

β - Coefficient of volumetric expansion.

Δt - Temperature difference between bulk temperature of fluid and t_s, °F.

ρ - Density, lbs./cu. ft. at t_f.

g - Acceleration due to gravity, 4.17×10^8 ft./hr. hr.

t_s - Temperature of surface, °F.

t_f - Average film temperature, $t_f = 0.5\ (t_s + t)$.

LIMITATIONS: The equation applies to fluids flowing with Reynolds numbers less than 2100. It is rarely used, since in most applications liquids of low viscosity will not move in streamline flow, in which case the equation for turbulent flow will apply.

SOURCES OF DATA: For physical constants for use in above equation see Chemical Engineers' Handbook - J. H. Perry, (1948).

for ρ -- see pp. 130-148, 175-195, 1583.
μ -- see pp. 370-374, 1198, 1696.
β -- see pp. 200-202, 1875.
K -- see pp. 459-461, 1303, 1697.
C -- see pp. 225-236, 297, 1588, 1696.

REFERENCES:

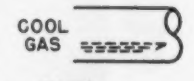
1. A. P. Colburn, Trans. Amer. Inst. Chem. Eng. 29, pp. 174-210 (1933).
2. Heat Transmission, W. H. McAdams, pp. 166-192.

P 5 b (1) (a)

COEFFICIENT of HEAT TRANSFER through FILM between INSIDE of WARM TUBE and COOL GAS

Tube Position: Horizontal

Gas Movement: Streamline Flow



EQUATION:

$$h_f = 1.62 \frac{K}{D}\left[\frac{\mu}{\mu_f}\right]^{\frac{1}{3}}\left[1+0.015 Z^{\frac{1}{3}}\right]\left[\frac{4wC}{\pi KL}\right]^{\frac{1}{3}}$$

where $Z = \left[\frac{D^3\rho^2\beta}{\mu_f^2}\Delta t g\right]$

TERMINOLOGY:

h_f - Heat transfer coefficient, BTU/hr. sq. ft. °F.

K - Thermal conductivity, BTU/hr. sq. ft. °F./ft.

D - Diameter of pipe, ft.

μ - Viscosity at bulk temperature of the stream, lb./hr. ft.; μ_f is evaluated at t_f, μ_s at t_s.

w - Mass rate of flow, lbs./hr.

C - Specific heat at constant pressure, BTU/lb.°F.

L - Heated length of pipe, in ft.

β - Coefficient of volumetric expansion, 1/°R.

Δt - Temperature difference between bulk temperature of fluid and t_s, °F.

ρ - Density, lbs./cu. ft. at t_f.

g - Acceleration due to gravity, 4.17×10^8 ft./hr. hr.

t_s - Temperature of surface, °F.

t_f - Average film temperature, °F, $t_f = 0.5\ (t_s + t)$.

LIMITATIONS:

The equation applies to fluids flowing with Reynolds numbers less than 2100, and with relatively low temperature difference between tube wall and fluid. It is rarely used since in most cases involving gases, other equations (usually concerned with turbulent flow) will apply.

SOURCES OF DATA: For physical constants for use in above equation see Chemical Engineers' Handbook - J. H. Perry, (1948).

for ρ -- see pp. 130-148, 175-195, 1583.
μ -- see pp. 370-374, 1198, 1696.
β -- see pp. 200-202, 1875.
K -- see pp. 459-461, 1303, 1697.
C -- see pp. 225-236, 297, 1588, 1696.

REFERENCES:

1. Colburn, A. P., Trans. Amer. Inst. Chem. Eng. 29, pp. 174-210 (1933).
2. Heat Transmission, W. H. McAdams, pp. 166-192 (1942).

P 4 b (1) (b)

about GOODALL Rotary Hose

Goodall has been FIRST with every worthwhile rotary hose development!

Here are some "eye-opening" facts about Goodall Long-Life Rotary Hose that it will pay you to consider before you make your next rotary hose purchase. First, Goodall is the only rotary hose with the built-in Barney Coupling. It is the only coupling that can be reset to save your hose from the scrap heap. Second, Goodall's flexible cord design has eliminated the cause of more than 90% of rotary hose failures. Next, Goodall Long-Life Rotary hose is strong, flexible, perfectly balanced. In addition, Goodall is the only rotary hose manufacturer that can protect your rotary hose investment with a maintenance plan. And finally, you pay no premium price for the extra quality, long life and high salvage value of Goodall Long-Life Rotary Hose. It costs no more than ordinary hose. So that's why we would like to suggest that you open your eyes to the facts about Goodall Long-Life Rotary Hose. There's none better on the Market!

Attention Goodall Rotary Hose owners: NEVER DISCARD A GOODALL ROTARY HOSE UNTIL YOU CONTACT US.

GOODALL RUBBER COMPANY

TRENTON, N. J.

GOODALL RUBBER COMPANY OF TEXAS: Houston, Odessa, Texas.
GOODALL RUBBER COMPANY OF CALIFORNIA: San Francisco, Los Angeles, Seattle, Salt Lake City, Portland.
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DISTRIBUTORS: Texas and Louisiana — Houston Oil Field Material Co.; Wilson Supply Co.
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OIL AND GAS EQUIPMENT Digest

IT'S NEW — CHECK IT

TRADE LITERATURE

1 STEARATES, a 32-page technical-service bulletin describes complete line of Witco stearates and their uses and properties. Various industries in which these compounds find applications and the characteristics of the compounds which fit them for each application are covered both generally and specifically. Government specifications of metallic stearates as to grade, specification number, and uses are listed. *Witco Chemical Co.*

2 TRANSMISSION SYSTEMS. Catalog T-50 describes pneumatic, magnetic, electric, electronic, and electronic-follower transmission systems for use in measurement and control of flow, pressure, liquid level, viscosity, and specific gravity. It is profusely illustrated and contains performance characteristics and schematic diagrams of various systems. *Fischer & Porter Co.*

3 INDUSTRIAL STEAM TRAP. Bulletin 351 features new Type D thermostatic bellows steam trap of bronze construction, sizes ¼, ⅜, ½, and ¾ in., in angle type only for pressure from vacuum to 200 lb. *W. H. Nicholson & Co.*

4 POWER PLANTS. This multicolored brochure describes and illustrates portable or stationary gasoline-engine-driven AC generator units in 2,000 and 1,000 watts, and battery type in 350 watts, together with capacity chart and list prices. *Cyclohm Motor Corp. Division, Howard Industries, Inc.*

5 SELECTIVE DUAL-ZONE PRODUCTION HOOK-UP. Schematic drawings graphically illustrate the functions and operations of this hook-up equipment which enables the operator to produce selectively, treat, or test either zone through the tubing while simultaneously producing the remaining zone through the annulus. *Baker Oil Tools, Inc.*

6 FLAME CUTTING, HERE'S HOW IT WORKS, an instructive and profusely illustrated booklet, discusses topics such as flame cutting, how a cutting torch works, how important is the oxygen jet, which fuel gas to select, hints on how to select a cutting tip, and how to select hand cutting torch or cutting attachment. *National Welding Equipment Co.*

7 GUIBERSON GAS-LIFT MANUAL. Illustrations, charts, and tables cover typical gas-lift installations, surface and subsurface equipment, sources of gas, fundamentals of the Guiberson Type A bellows valve, installation data, and a glossary of technical terms. *The Guiberson Corp.*

8 TEXROPE GROMMET V-BELTS describes a V-belt made without a splice. Cross-section illustrations show how Texrope V-belt provides a high gripping pressure under all load conditions. According to Bulletin 20B6497A, the new belt has much less shrinkage and stretch than other belts. *Allis-Chalmers Manufacturing Co.*

9 VACUUM—THE MAGIC HAT OF INDUSTRY—is a bound, 12-

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Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, Feb. 2, 1953

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page magazine reprint, written in simple, nontechnical language and it describes the many and varied uses of vacuum throughout industry. Included are full-page charts on vacuum applications. *Ingersoll-Rand Co.*

10 SOULE STEELINE BUILDINGS. A 2-color, 24-page brochure describing the economy, versatility and ease of erection of these steel buildings, includes detailed drawings, charts, photographs, and descriptive material, on 32, 40, 50, 60, and 70-ft. widths with lengths available in multiples of 20 ft. *Soule Steel Co.*

11 GYPSTONE WATER TREET is a two-color folder describing an inhibitor that will solve most corrosion problems. The folder covers the use of Gypstone in preventing scaling problems, in preventing underground corrosion, and in prevention of corrosion in oil and gas wells. *Mid-State Chemical Co., Inc.*

12 MANNESMANN TUBES OF HEAT RESISTANT STEELS. This 20-page illustrated booklet includes sections on characteristics of structure and properties, cold working, welding, surface finish, material specifications, range of dimensions, and manufacturing program. Illustrations show heat-transfer equipment and tube bundles. *Mannesmann - Export GmbH.*

13 PIPELINING ON SCHEDULE, an eight - page booklet tells the story of diesel engines in pipe-lining machines and equipment. Picture captions illustrate electric sets, cranes, shovels, ditchers, and compressors proving their worth on pipe-line construction jobs. *Caterpillar Tractor Co.*

14 NOCOR 102 is a bulletin that offers detailed information on a new corrosion inhibitor which utilizes different chemisorptive powers to form a tight, impervious film, a chemical bond between product and steel. *Cardinal Chemical, Inc.*

15 MULTIPLE V AND FHP BELTS. New simplified conversion tables are featured in this new eight-page, four-color catalog on V-belts for industrial use. Tables enable user to determine more quickly and easily, the correct Thermoid belt to order in replacing worn-out belts. *Thermoid Co.*

16 WHERE TO USE TAPECOAT, a new illustrative brochure, based on the company's experience in serving the gas and oil transmission fields, is designed to help solve corrosive problems. It includes details on how and where coal tar protection can be used to best advantage and offers case histories to show how corrosive problems have been overcome. *Tapecoat Co.*

17 ALCO PRODUCTS REVIEW features an evaluation of the properties of weld metals for low-temperature service. The paper discusses materials used in the fabrication of pressure vessels, the investigation of ferritic electrodes to determine the properties of deposited weld metals, and the Charpy notched-bar properties of weld metals at various temperature levels. *American Locomotive Co.*

18 RUST-OLEUM STOPS RUST! The new general catalog featuring 73 color chips of Rust-Oleum products, includes complete instructions for surface preparation and application of Rust-Oleum primers, short oil type, long oil type, machinery and implement finishes, chemical and heat-resistant types, sealers, thinning oils, and floor and masonry coatings. *Rust-Oleum Corp.*

19 DEMINERALIZATION AND SILICA REMOVAL. This new bulletin, 3803, describes the chief applications, principles of operation, design features, advantages, recommendations, and specifications of Permutit's demineralizing and silica-removal apparatus and synthetic resins. *Permutit Co.*

20 51 SERIES LINK-BELT SPEEDER is the title of a new ½-yd. shovel-crane catalog. The fully illustrated catalog, No. 2428, covers a complete line of ½-yd. shovel-cranes including the firm's crawler-mounted LS-51, the truck-mounted HC-51, and the wheel-mounted MS-51 models. Included are comprehensive data covering the upper machinery, and crawler, truck, and wheel-mounted lower mechanisms for each model. *Link - Belt Speeder Corp.*

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Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, Feb. 2, 1953

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THE OIL AND GAS JOURNAL
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OIL AND GAS EQUIPMENT Digest

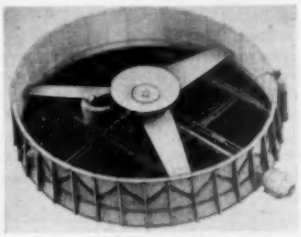
IT'S NEW CHECK IT

by Dan B. Miller

21 TANK SHUTOFF CONTROL is a complete unit including check valve, for improved tank line performance. This shutoff eliminates air in the pump suction to reduce pump wear and loss of pump capacity. Tank discharge is started and stopped automatically without any attention from the pumper. It shuts off every time at the same tank level. Since the control has few working parts to require attention, maintenance is greatly reduced, while lost pumping time, due to breakdown, is practically eliminated. Beveled vent valve and beveled seat assure accurate and positive seating. A feature of the design is ease in replacing and cleaning parts. The lift rod allows limited lift to the discharge valve when necessary to empty a tank completely. By removing the top gland, additional lifting of the rod causes the packing to be ejected for replacement. A lucite cover on the indicator of the control allows observation from any angle. The red ball float on the indicator is raised by the float and indicates the position of both the float and discharge valve. *Beaumont Iron Works Co.*

IT'S NEW CHECK IT

22 CLASS 7,000 TYPE C fans are furnished in two basic sizes. Series 48, (48-in. diameter hub), and Series 72, (72-in. diameter hub). These units are furnished with any number of blades, from two to eight as indicated by performance requirements. These units are available in standard diameters up to and including 24 ft. Larger units are available on special order. The units are constructed of corrosion-resistant materials throughout, and may be ordered in monel stainless steel or silicon bronze. Of special interest is the resilent mounting of the blades which actuates a hinged joint permitting the blade to find a position in operation where centrifugal force balances out the forces of lift and drag. This feature eliminates bending stresses at the root of the blade, and allows the blade to rise and fall under shocks by turbulent air. Moore units, operating at design pitch, provide a uniform velocity from the hub to the tip. Another feature is the unitized pitch adjustment, which provides simultaneous adjustment of all blades by means of one nut. Pitch change can be made in less than 5 minutes. Blades must remain uniform in angle, preventing aerodynamic unbalance. *The Moore Co.*



IT'S NEW CHECK IT

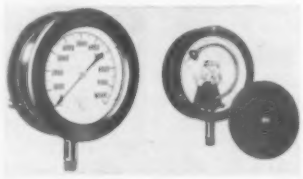
23 IDECO CRAIGO JOINT ROTOR. With this joint rotor one man can stab bits and subs in half the time ordinarily required for making up tools. The joint rotor is strong, lightweight, and easy to operate. It also reduces wear on the starting threads and shoulders. Designed to fit into the rotary table, the joint rotor consists of telescoped pipe base which encloses a powerful spring. This provides a resilent support for the turntable top which is constructed to accommodate most varieties of bits and tools. The equipment is easily portable as it weighs only 60 lb. It has a total height of 15 in. when fully extended. *Ideco, A Division of Dresser Equipment Co.*

IT'S NEW CHECK IT

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

Keep Informed. Save Time. Tear Out Card. Check It. Mail It.

24 ASHCROFT MAXISAFE DURAGAUGE combines absolute protection to the viewer with easy entree to the entire gage movement and tube assembly for inspection, recalibration, or repair. An integrally cast solid wall separates the dial from the gage movement and tube. A double spring-mounted safety release plate covers the entire back of the case. The plate permits the discharge of the pressure media away from the viewer. Teflon coated to prevent being painted closed or otherwise adhering to the gasket, the safety release plate fits tightly on a rubber gasket and is being held in place by a small knurled knob. Less than ½ psi. pressure forces open the safety release plate. Pressure ranges include 15 psi. or vacuum minimum to 100,000 psi. maximum. Maxisafe sizes include 4½, 6, and 8½-in. and there is a wide selection of Bourdon tube materials and case designs. *Manning, Maxwell & Moore, Inc.*



IT'S NEW — CHECK IT

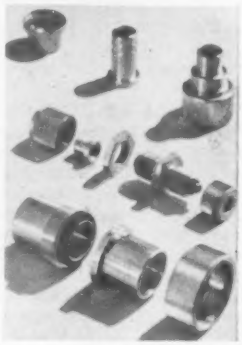
25 NEW LIGHTWEIGHT BRUSHMASTER. The air-cooled, two-cycle motor is dependable as well as easily maintained. The circular saw blade can be replaced in a matter of seconds. The entire machine weighing only 35 lb. is easily carried by one man by a sling suspension-type belt. No moving parts of the motor are exposed. An angular bar prevents the operator from moving into the blade. The engine throttle is located at the hip for quick engine control, and an automatic clutch disengages the saw when the engine is idling. The Brushmaster, operated by one man, will cut as much brush, in a given period of time, as six good hand cutters. It is completely effective on briars, brambles, vines, brush, or on stout saplings up to 4-in. in diameter. *Brushmaster Saw, Inc.*

IT'S NEW — CHECK IT

26 UNIVERSAL FLAME CUTTER is a precision tool used for reworking, reconditioning, and salvaging all types of new and used welding ells, tees, flanges, reducers, and other piping. The unit will cut ells to any angle, shorten ells, tees, flanges, and reducers, and will recut and bevel used ells, tees, swedges, and returns. Additional uses for the Flame Cutter are: cutting small miters, 22½° or less; cutting holes in blanks for slip-on reducing flanges; making swedges out of welding caps, and cutting and beveling short pieces of pipe up to 36 in. in diameter. The Flame Cutter is mounted on a sturdy steel base. It has a unitized control panel and unitized gas-control valve. The table which holds the fitting revolves in either direction at speeds varying from 0-5 r.p.m. The adjustable degree plate permits the fitting to be cut at any desired angle. *Vernon Tool Co., Ltd.*

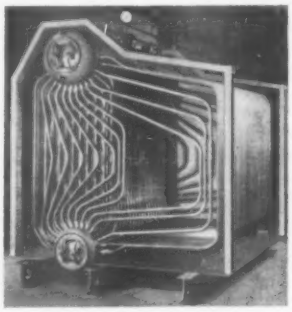
IT'S NEW — CHECK IT

27 VACUUM CONNECTORS are for joining tubular elements in vacuum systems. Type CHV is for making a vacuum-tight metal-to-glass connection and is especially useful in making a leak-proof seal with the glass stem of a thermocouple, Pirani, ionization, or other type vacuum gage. Type CHV is hand tightened, requiring no special wrench, and permits rapid connection or disconnection of vacuum systems. The O-ring, which compresses to make the positive seal, is of special composition suitable for high vacuum use and temperatures to 200° F. This new line also includes metal-to-metal connectors fitting standard tubings. The universal vacuum release valve is designed to provide a fast and convenient means of admitting air to a vacuum system. It may be connected by welding, brazing, or soldering to the metal tube of the vacuum system and, if desired, may be mounted on a panel or through a plate. *Central Scientific Co.*

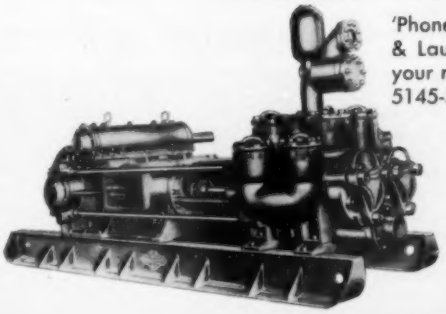


IT'S NEW — CHECK IT

28 PACKAGE-TYPE WATER-TUBE BOILERS. The boilers are offered in sizes ranging from 7,500 to 30,000 lb. of steam per hour (or equivalent water ratings) and in design pressures of 200, 300, 600, and 900 psig. all are of a two-drum, bent-tube design featuring a water-cooled furnace in which tangent water tubes completely shield the full-length combustion chamber. Large water capacity gives the boilers exceptional ability in handling heavy peak and fluctuating loads. Provision for superheat up to 200° F. is available as auxiliary equipment. Firing is by oil or gas or combination burners. Units are offered with complete burner and control assembly or boiler can be purchased separately, enabling the purchaser to select make and type of burners and controls desired in specification. The boilers are enclosed in a gastight insulated steel jacket of special sectional design and are suitable for outdoor, as well as indoor installation. Completely assembled units can be moved easily from one location to another, making them practical for temporary and emergency installations. No special foundations are required since the units are built upon a rigid steel frame base. *Springfield Boiler Co.*



Duplex Slush Pumps drillers brag about!

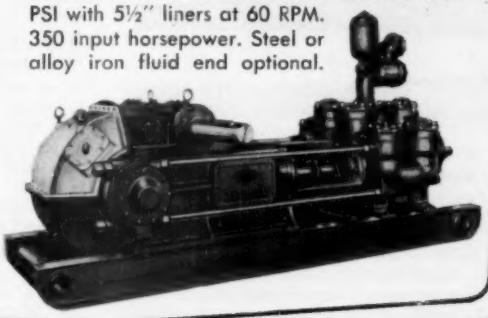


'Phone now for bulletins (your Jones & Laughlin store has them) or open your new Composite Catalog to page 5145-5164.

HP-8000 7¼" x 12" delivers 577 GPM at 555 PSI with 7¼" liners to 322 GPM at 995 PSI with 5½" liners at 70 RPM. 220 input horsepower. Steel or alloy iron fluid end optional.

WHELAND

HP-14000 7½" x 14" delivers 613 GPM at 838 PSI with 7½" liners to 316 GPM at 1627 PSI with 5½" liners at 60 RPM. 350 input horsepower. Steel or alloy iron fluid end optional.



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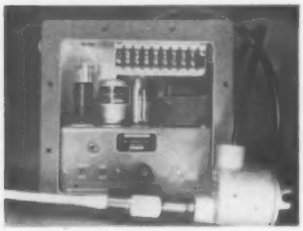
29 CAPACITANCE PROBE FOR HIGH-TEMPERATURE AND CORROSIVE APPLICATIONS. A new type of level detection instrument provides continuous, dependable operation even under the most severe conditions. The probe, a capacitive sensing element, may be used bare or covered with various insulation materials such as nylon, teflon, or neoprene, for use with various corrosive materials. The indicating and amplifying unit which may be remotely mounted up to 100 ft. from the probe, is encased in an explosionproof housing for mounting in hazardous areas. The instrument has a tube complement of three along with sensitivity adjustment and one d.p.d.t., 110-volt, 10-amp. contact relay. Each contact is available on a terminal strip for ease in making connections. Temperatures may range from —65° to +1,500° F. with a working pressure of 30-in. vacuum to 1,000-lb. on the probe itself, and from —40° to +200° F. on the indicating unit. *Instruments, Inc.*



IT'S NEW — CHECK IT

30 WIRETEX is a special type of flexible, high-pressure, industrial rubber hose. The hose has unusual

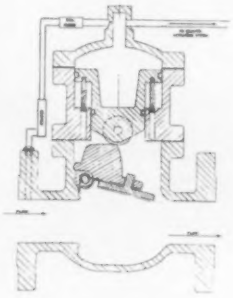
characteristics of strength, flexibility, oil, and abrasion resistance, plus an ability satisfactorily to withstand effects of both high and low temperatures. It is made with a mandrel-cured, Reprene tube in lengths up to and including 60 ft. The tube is reinforced with a specially selected textile carcass which is continuously braided around the tube in multiple rubber-impregnated plies, or with alternating plies of braided fabrics and braided plies of wire, or with multiple braids of standard or extra-heavy wire only. The hose carcasses are encased in either abrasion-resistant, thick rubber covers or covers made of braided textiles. Wiretex is designed to carry various types of gases or fluids under both high and low pressures. The hose is not weakened by constant vibration or flexing and it will not rust or corrode. *Republic Rubber Division of Lee Rubber & Tire Corp.*

IT'S NEW — CHECK IT

31 AMPHESIVE 801 AND ALFANTE are adhesive products for bonding foamed styrene to metal or other surfaces. The adhesives are available as liquids or mortars which can be sealed by pressure contact to secure exceptionally high bond strengths. *The Atlas Mineral Products Co.*

IT'S NEW — CHECK IT

32 PISTON-OPERATED QUICK-OPENING VALVE affords the latest in flexibility and speed of action to fire and other emergency control systems in petroleum industry plants. Any number of the valves may be operated from one set of controls. They may also be closed by remote control and may be operated manually or in combination with fire fused seals, pneumatic controls, or open or closed-circuit solenoid. Since the valve closes against line flow, there is no resultant line shock. Uses for the piston valve range from opening water into quench lines, sprinkler, spray, or fog systems, to dumping process vessels to outside storage in times of plant fire. When the piston valve is in a closed position a positive closure is assured, since its disk is faced with vulcanized specially prepared Hycar. Quick action is similarly assured through line pressure exerting full force on the valve disk. In L.P.G., propane, and butane fire-fighting service it permits vapor liquid dumping at pressures below relief valve settings, thus preventing rupture of overheated vessels by reduced pressure. Standard valves in this series are rated at 250 psi. *McRae Corp.*



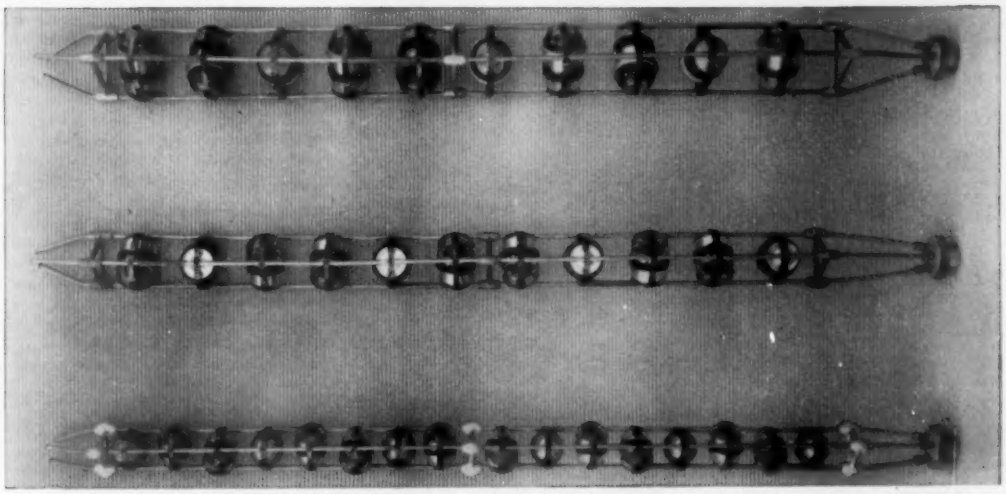
IT'S NEW — CHECK IT

33 REDESIGNS TRUCK PUMP LINE. Type G pumps are for direct connection to the power take-off of tank trucks. Design changes in the pump itself resulted in smaller size and less weight, both of primary importance in installations on tank trucks. Four basic models are now in production. They are all self-priming centrifugals with diffuser-type priming. Each model can be supplied for clockwise or counter-clockwise shaft rotation and choice of five discharge ports. Two gear ratios are available, 1 to 4.14 and 1 to 2.79. These variations form a total of 16 new truck pump models with capacities ranging up to 400 g.p.m and pressures sufficient to overcome the friction of meters, fittings, and hose. *Marlow Pumps.*

IT'S NEW — CHECK IT

DOWELL GLASS GUN PERFORATING SUCCEEDED WHERE OTHER METHODS FAILED

Gas Well Production Increased from Show To 3½ Million Cubic Feet Per Day— Exceeding Requirements for Gas Drive Project



Dowell Glass Guns can be assembled to fit practically any well diameter that may be encountered. Three different sizes of charges permit gun construction as small as 3⅜ inches and up to 3 feet or more in diameter. Special "angle" guns shoot 30 degrees off the horizontal to penetrate shale streaks and give better formation drainage.

Here is an example of the effectiveness of Dowell's Glass Gun . . . producing results after regular bullet and steel gun jets had failed.

This well was completed as an oil well but was found to be non-profitable. It was then plugged back to a known gas zone. Several unsuccessful attempts were made to recomplete the well by perforating the 23-lb. 7-inch OD casing and the cement. Both bullets and steel gun jets, at 6 shots per foot, gave only a show of gas.

Dowell was then called to perforate with the Glass Gun. After 70 GG7 shots, at only 2½ shots per foot, the well was producing at a rate of 3½ million cubic feet per day. The remainder of the job was called off because the gas drive project required only 2 million cubic feet of gas per day.

In addition to greater penetration, Glass Guns give larger perforation hole size. They are also of value in open hole shooting because they are self-destroying and leave a junk-free hole.

Glass Guns are run on Dowell Electric Pilot equipment engineered for accurate sub-surface measuring.

If you would like to know more about this exclusive, horizontal-firing Glass Gun, the Angle-Jet Gun, the Mono-Directional Glass Gun, or any other Dowell oil field services, make it a point to contact your nearest Dowell office. Or write directly to Tulsa, Dept. B11.

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Paraffin Solvents · Jelflake® · Bulk Inhibited Acid
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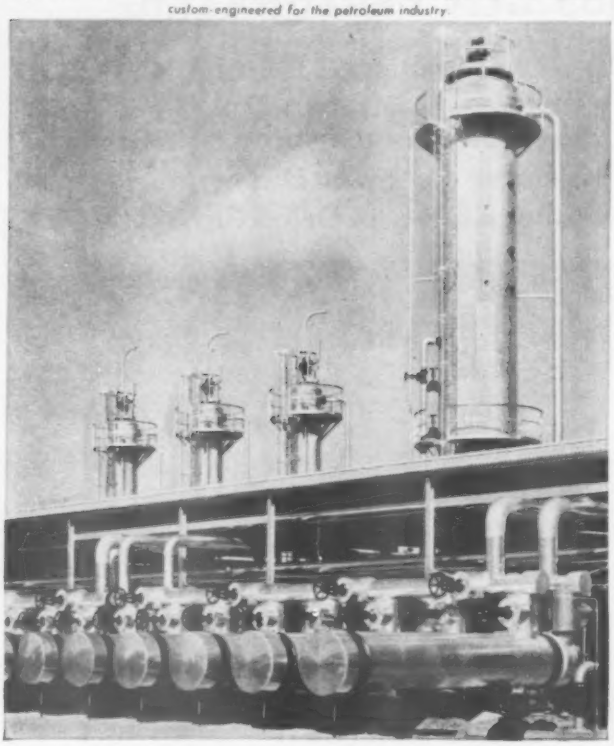
FOR OIL INDUSTRY CHEMICAL SERVICE

Major refineries from Beaumont to Bagdad rely on Alco heat exchangers and other equipment custom-engineered for the petroleum industry.



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Bubble Trays
Butane and Propane Storage Tanks
Electric Welded Steel Pipe
Fabricated Plate Work
Fractionating Towers
Heat Exchangers
Prefabricated Pipe
Reboilers
Receiving Tanks
Scrubbers
Steam Generators
Tank Suction Heaters
Transfer Line Exchangers

Weights: 100 to 300,000 pounds
Diameters: 4 inches to 12 feet
Pressures: high-vacuum to 3000 psi
Temperatures: −300 F to +1150 F

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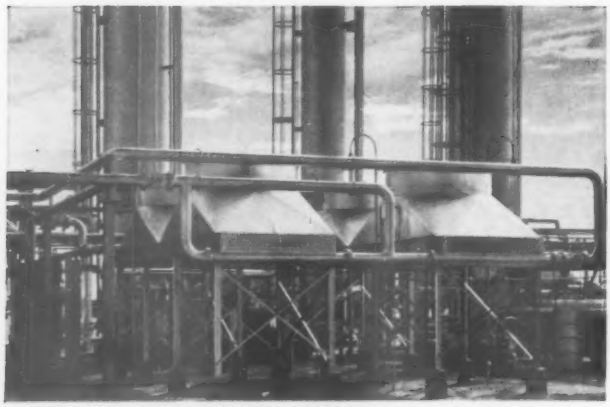

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PIPE LINES

Over-All Construction Gain For Gas Pipe Lines Forecast

CHICAGO.—Gardiner Symonds, president of Tennessee Gas Transmission Co., predicted recently that natural-gas pipe-line construction probably will be a bit slower this year but should more than make up the lag during 1954 and 1955.

Symonds told the Midwest Forum of Security Analysts meeting here that there always is a certain amount of confusion when the administration is changed and that under such conditions it is reasonable to expect pipeline companies to proceed cautiously for a time.

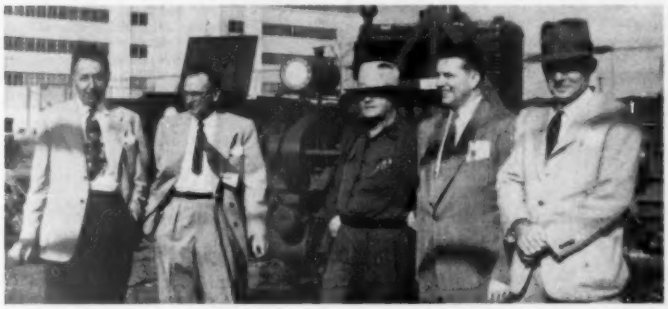
Rules and procedures within the administration of the Natural Gas Act will undergo stabilization, and pipe lines won't know what interest rates to expect until the administration carries out a certain amount of refunding of government debt, he said.

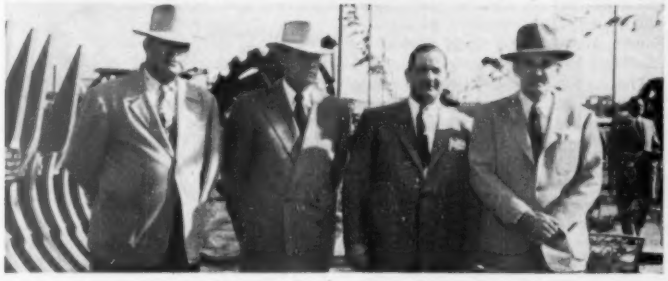
In Symonds' opinion, the industry's two biggest problems are the climbing cost of senior money and the Federal Power Commission's failure to understand what it takes to attract equity capital as well as senior money. Until FPC realizes that the companies must be allowed a rate of return that will draw necessary capital for expansion, he said, customers now waiting for gas will continue to wait and pipe-line growth will be a thing of the past.

Arkansas to Consider Mile Tax on Oil and Gas Lines

LITTLE ROCK.—A bill has been introduced in the Arkansas House of Representatives proposing a graduated tax ranging from $10 to $75 annually per mile on petroleum products and natural-gas lines exceeding 75 miles in length.

The levy would range from $10 per mile for lines 12 in. or less in diameter to $75 per mile for any pipe lines over 26 in.





On Hand for Pipe-Line Equipment Exhibit

These men are part of the throng of pipe-line contractors which descended on Houston for the fifth annual Pipe Line Contractors Association convention at the Shamrock Hotel (The Oil and Gas Journal, January 26, page 173). They are (top photo, left to right) N. A. Saigh, N. A. Saigh Co., Inc., San Antonio; C. K. McClure, Dunham-Pugh Co., Monroe, La.; J. A. Cantrell, Houston Contracting Co., Houston; Richard Lyonds, R. C. Larkin Co., Chicago; R. P. Gregory, Houston Contracting Co.; (bottom photo, left to right) George Allen, Dallas; A. T. Maxwell, Dallas; Charles S. Le Noir, Western Pipe Line Construction, Inc., Austin; and R. P. Gregory, Houston Contracting Co.

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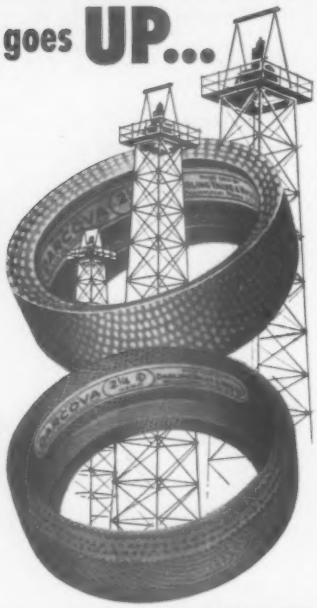

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All revenue from the tax would be used for support of the public-school system. The bill would become effective immediately upon its passage.

It is estimated that the tax would affect from 800 to 1,000 miles of lines in the state.

Kansas-Nebraska Gets Permit to Expand System

WASHINGTON.—Kansas-Nebraska Natural Gas Co., Inc., Phillipsburg, Kans., has been authorized by the Federal Power Commission to expand capacity of its natural-gas-transmission system in Kansas and Nebraska by 10,000,000 cu. ft. daily to a new total of 192,590,000 cu. ft. daily.

The authorization, filed by an FPC examiner, is tentative and therefore subject to review by the commission itself, either upon appeal by parties to the proceeding within 20 days or upon the FPC's own motion within 30 days.

The $2,576,686 project involves the construction of about 196 miles of pipe lines, some of which will replace sections of existing lines, and the rearrangement of certain compressor installations. It is part of an expansion program undertaken by the company to meet growing demands in its service area.

FPC recently permitted Kansas-Nebraska to abandon a 13-mile, 6⅝-in. line from the Minden area to Kearney in Nebraska and to lay a new 10-mile, 2-in. line.

Fourth Annual Tulsa Short Course Set for March 4-6

TULSA. — Pipe coatings, corrosion surveys, expendable anodes, rectifiers, and insulation are some of the subjects which will be covered during the Fourth Annual Tulsa Short Course for Pipeliners to be held here March 4-6.

The course, sponsored by the Tulsa Section of the National Association of Corrosion Engineers, is designed specifically for pipe-line foremen, superintendents, field engineers, and inspectors.

The general theme, "Practical Control of Pipe Line Corrosion," will be observed in group discussion, lectures, and field demonstrations led by such experts in the field as Fred M. Cloninger, Texas Pipe Line Co.; Lancy F. Heverly, Great Lakes Pipe Line Co.; F. M. Hieronymus, Barrett Division of Allied Chemical & Dye Corp.; Marshall E. Parker, Jr., Cormit Engineering Co.; and Y. W. Titterington, Pipe Line Anode Corp.

Headquarters will be at the Mayo

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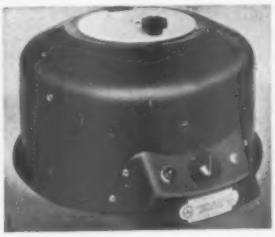

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Hotel, according to Committee Chairman W. A. Hutchison, chief corrosion engineer for Sinclair Pipe Line Co. Field demonstrations will be conducted at a site near Tulsa.

Besides Hutchison, membership of the planning committee includes Edward A. Bartolina, Moorlane Co.; James C. Bell, Service Pipe Line Co.; Hugh A. Brady, Pipe Line Anode Corp.; Melvin E. Maddox, Pittsburgh Coke & Chemical Co.; and T. D. Williamson, Jr., T. D. Williamson, Inc.

Ohio Commission Slaps at FPC for Texas-Ohio Actions

COLUMBUS.—The Public Utilities Commission of Ohio fired a new blast at the Federal Power Commission here last week over handling of the Texas-Ohio Gas Co. case.

The Ohio commission charged FPC with failure to follow the Natural Gas Act in exceptions to FPC orders which denied Texas-Ohio authority to lay a 1,400-mile, $185,000,000 gas line from the Rio Grande River in Hidalgo County, Texas, to the vicinity of Lancaster, Ohio.

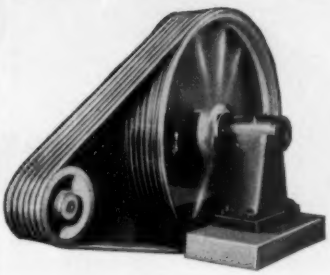
FPC rejected Texas-Ohio's application November 7 on grounds that the company failed to show that the operation of the big line "is required by present or future public convenience and necessity." In a surprise move on December 31, the power commission designated its November decision as tentative *(The Oil and Gas Journal, January 12, page 141)*.

The effect of this latter action, the Ohio body said, "would be to deny to the Public Utilities Commission of Ohio the right to review by the Court of Appeals . . ."

The Ohio agency also charged that the November 7 order was "erroneous and contrary to law," and, further, "that said Federal Power Commission was without statutory authority" to change the original order.

The utilities commission has been an ardent supporter of Texas-Ohio's proposed pipe line. In its original decision, the agency contended, FPC did not consider Ohio's "critical 5-year shortage of natural gas," which made necessary 12 emergency orders." It also said FPC was wrong in demanding that the company prove "absolutely adequate supplies," pointing out that no gas company serving Ohio has had adequate supplies for 5 years. The agency said the shortage already had increased the cost of constructing new homes.

Wood's V-BELT DRIVES



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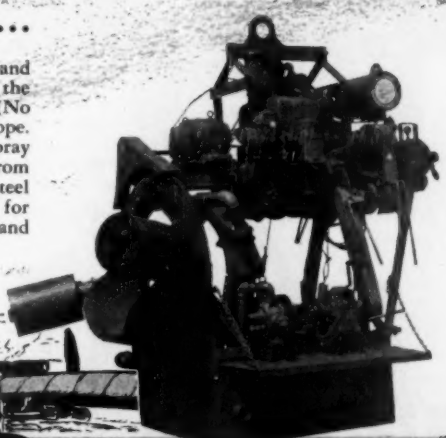

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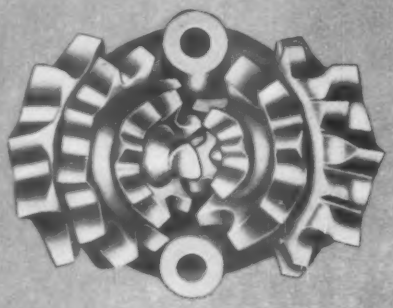

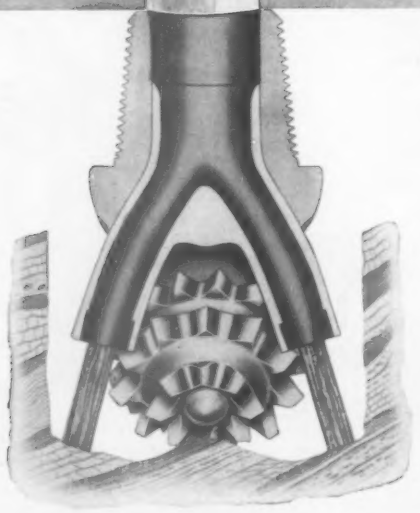

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Among the Drilling Contractors

Calgary Contractor on Saskatchewan Discovery

Commonwealth Drilling Co., Ltd., of Calgary, is contractor on the apparently big light-oil strike in the Southeast Saskatchewan portion of the Williston basin.

The discovery was made at Tide Water Associated Oil Co. 1 Forget Crown, LSD 2, 11-9-7w2, about 50 miles north of the International boundary. The well, which flowed oil at the rate of 150 bbl. per hour on drill-stem test of the upper Mississippian, was drilled to a depth of 3,958 ft.

The Forget wildcat lies 63 miles northeast of the Ratcliffe discovery well and about 50 miles southeast of the recent medium-gravity oil discovery at Wapella where Commonwealth is also active on comparatively shallow tests.

Steve Rowe, Wichita Falls, Tex., has a contract with Humble Oil & Refining Co. for a 6,000-ft. Ellenburger test, 1 Norwood, at a wildcat location in 296-64-H&TC Survey, Taylor County, Texas.

Delaware Drillers, Inc., is the contractor on a projected 4,700-ft. wildcat test being started by Richard King, Jr., at 1 Raasch, 12 miles north of Sidney, in Cheyenne County, southwestern Nebraska.

Newcastle Drilling Co., Newcastle, Wyo., has a rig working for Voss Oil Co. on a wildcat test in the Black Thunder Creek area, 9 miles southwest of Clareton, in Weston County, Wyoming. Location is at 1 Scott, in the SW NW SE 23-42n-66w.

H & S Drilling Co., Tulsa, is drilling for C. L. Norsworthy at 1 Fields, a wildcat test located 10 miles southeast of Sonora, in Sutton County, West Texas. **M. J. Delaney Drilling Co.,** Dallas, also is drilling for the same operator at another wildcat, 1 Morris, 20 miles south of Sonora.

Tex Levieux, Okemah, Okla., cable-tool contractor, has contracted with Arkansas Western Gas Co. of Fayetteville, Ark., for a 4,000-ft. wildcat test to be drilled 2½ miles northwest of the White Oak gas field, in Franklin County, northwestern Arkansas. Rig for the test will be moved in as soon as it can be released from a well the contractor is drilling for the same company in the White Oak field.

Jet Drilling Company, Inc.

Wichita and Denver

ONE of the progressive drilling contractors in the Denver-Julesburg basin of western Nebraska and northeastern Colorado is Jet Drilling Co., Inc., of Denver and Wichita. General offices are maintained in the Central Building in Wichita.

H. E. ZOLLER

Organized on January 1, 1952, with Henry E. Zoller, president; Glenn W. Peel, vice president; and Irving Hardman, secretary, the firm now has three rigs operating on 5,000 to 5,600-ft. contracts on both the Colorado and Nebraska sides of the Denver-Julesburg basin. However, using 4½-in. drill pipe, two of these rigs are capable of drilling to 10,000 ft. Last year one 8,600-ft. test was drilled by the firm in Wyoming.

Personnel . . . Other key personnel of firm includes: A. M. Scott, treasurer; Ray Raines, drilling superintendent; and Verle Hulse and C. J. Pulliam, tool pushers.

Equipment . . . Rig No. 1 recently finished a 4,652-ft. contract for Sunray Oil Corp. in Logan County, Colorado. This medium depth rig is mounted on a 7-ft. substructure, and is equipped with 131-ft. mast.

Rig No. 2 currently is drilling for Plains Exploration Co. of Denver, in the Luft field of Logan County, Colo-

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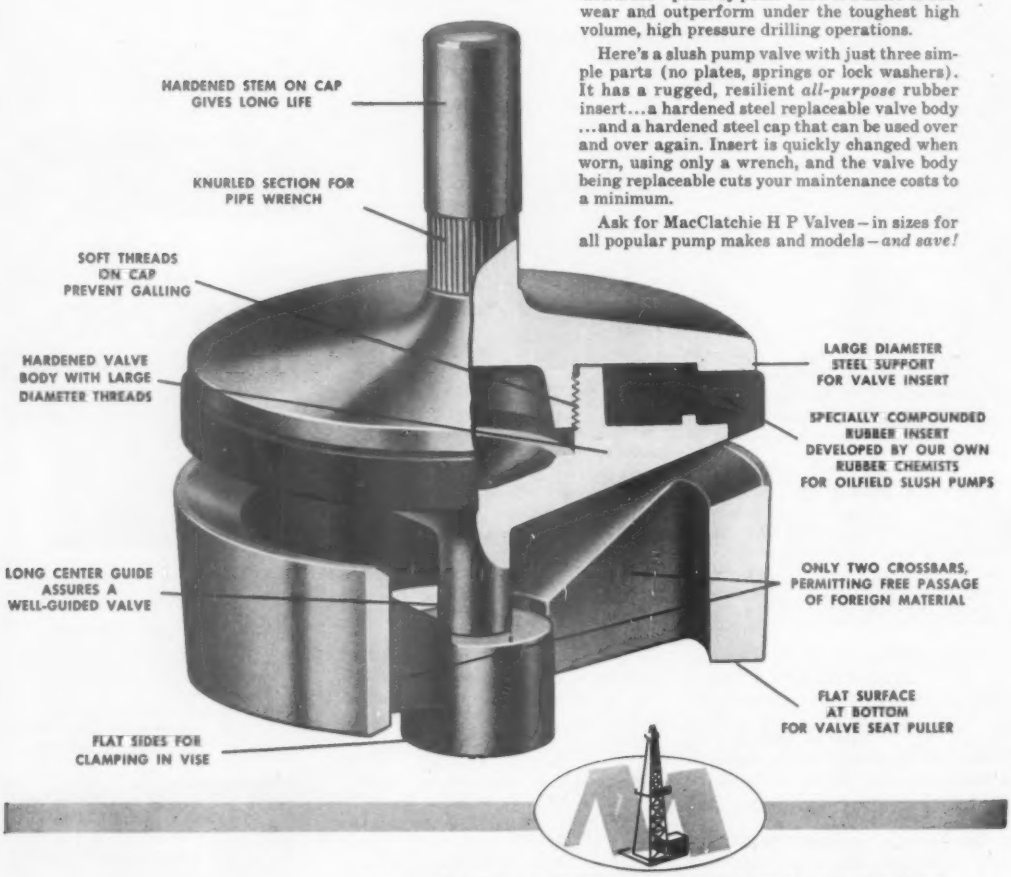
HARDENED STEM ON CAP GIVES LONG LIFE
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rado. The rig has a Model N-7 draw works driven by three twin-diesel engines. The mud pump is a 16-in. unit. The 133-ft. mast is mounted on the 10-ft. substructure.

Rig No. 3 is drilling for Shell Oil Co. in the Southwest Potter field of Kimball County, Nebraska. Its N-75 draw works is driven by three twin-diesel engines. The 133-ft. mast is mounted on a 10-ft. substructure. The rig is equipped with a double-ram hydraulic blowout preventer.

Denman Drilling Co., Wichita Falls, Tex., has drilling under way on the Arizona wildcat it has contracted to put down for The Texas Co., Sinclair Oil & Gas Co., and Skelly Oil Co., joint operators. Location is in the NE NW NW 12-41n-18e, on the operators' Hoskinni unit, in Navajo County.

Burton Drilling Co., Houston, has moved a rig to North Carolina for a Cretaceous test it will drill in the Hofman Forest area, 9 miles north of Jacksonville, in Onslow County. Objective is expected around 4,000 ft.

Colorado-Wyoming Drilling Co., Denver, is moving in for a 6,400-ft. Dakota test which it will drill for Sherrod & Apperson at 1 County, in the NE SE SW 1-3n-61w, 19 miles west of Fort Morgan, Weld County, northeastern Colorado.

Charles E. Hipp, Graham, Tex., is drilling a deep, rank wildcat test in Brewster County, in the Big Bend country of far-western Texas, for George S. Engle. Location of the test, 1 Roark, is in 38-G18-TCRR Survey, 25 miles south of Sanderson. It is the first of several rank wildcats which Engle proposes in that county. Projected depth is 12,000 ft.

ACTIVE ROTARY RIGS*

(United States and Western Canada)

Area—	Week ended 1-26-53	Change week ended 1-19-53	Change week ended 1-28-52
Gulf Coast	613	+ 5	+ 21
N. & W. Tex.-N. M.	751	−26	−276
Ark.-N. La.-E. Tex.	135	− 4	− 45
Oklahoma	316	−13	− 24
Kansas-S. Nebraska	159	+ 8	+ 6
Illinois-Eastern	81	− 8	− 4
Rocky Mountain	205	−10	+ 45
Pacific Coast	179	0	+ 45
Total U. S.	2,439	−48	−267
Western Canada	158	− 7	− 15
Total	2,597	−55	−282

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and Illinois and California are shown on pages 144 and 145.

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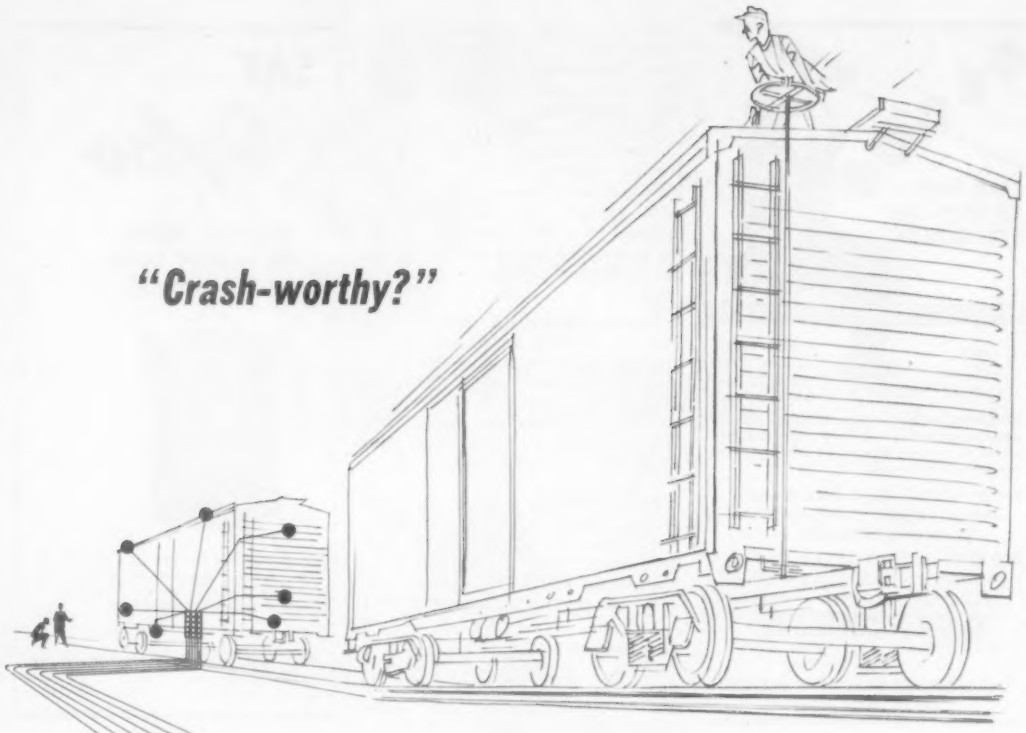

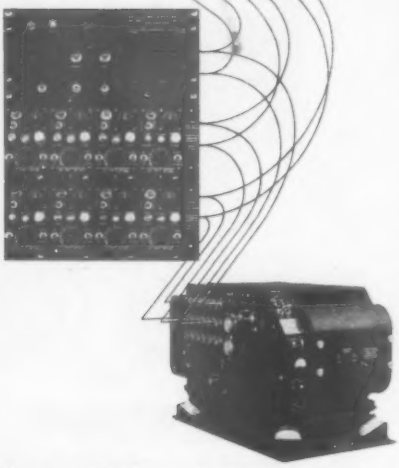

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To determine stress distribution and to evaluate the effectiveness of shock protection devices, the Pullman-Standard Car Manufacturing Company selected a Consolidated 5-114 Recording Oscillograph, System D Amplifiers, and Bridge Balance as basic recording instruments.

Freight cars, loaded with sand and steel blocks at gross weights ranging from 46,400 pounds (empty) to 164,000 pounds (fully loaded) crashed together 185 times at speeds up to 10 miles per hour.

In this way the dynamics of simultaneous shocks, some as brief as one five-thousandth of a second, were permanently recorded in visual form. From such data will come design changes, giving protection against shock and vibration damage. Thus an improved product is achieved.

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Dynamic Recording Systems

such as the one shown here are designed and manufactured by Consolidated. Variations in the arrangement of the equipment are infinite. Applications are widely varied throughout industry and the sciences. A typical recording system includes pickups, amplifiers or bridge balances, and a recording oscillograph. Write for Bulletin CEC 1500B-X3

REFINING

Competition Gains

Constructors, however, not yet ready for fixed price

NEW YORK. — Materials and labor conditions and the outlook for construction of new plants in the petroleum, chemical, and steel industries occupied the attention of the National Constructors Association, convening here recently for its annual meeting.

Statistics compiled from 17 member companies records showed that employment in the field hit a new peacetime high during the last half of 1952. Construction of new plants will continue high during the first half of 1953, but some decline in actual field work under way is anticipated for the last 6 months of this year.

Despite the leveling-off in new contracts, spokesmen for some member companies expressed the view that competition for new jobs had not reached the point where constructors could bid fixed prices. The fixed fee, expressed as a percentage of estimated cost, remains the principal practice in negotiating new contracts.

Materials easing . . . The materials situation is expected to ease this year, and although labor rates will probably not decline and may even go up, a higher labor productivity is expected to hold the line or reduce over-all labor costs, it was observed.

In foreign operations, the trend in refinery and chemical plant building seems to be one of decentralization. While South America led in new plant construction 5 years ago, and Europe took the lead under E.C.A. stimulus, constructors now note that new plants are going in all over the globe. South Africa, India, and Australia are primary examples today.

Regarding petrochemicals, association representatives expressed the view that natural gas may in the not-too-distant future be priced out of the raw-materials market competition between transmission companies serving the North and East with industrial and home-heating fuels. The gradual trend, it was indicated, will be back to coal, as gas prices edge upward and new coal-hydrogenation techniques are improved.

Conoco Expansion at Lake Charles Nearing Completion

LAKE CHARLES, La.—Continental Oil Co.'s modernized and expanded refinery here is scheduled to go on stream early this year.

Crude-oil capacity of the expanded plant will be approximately 45,000 bbl. daily, nearly four times the plant's current rating.

Other major units expanded during the project are catalytic cracking, 17,000 bbl. per day, and Platforming, 6,000 bbl. per day. Along with these processes are new facilities for increasing production of alkylate and polymer.

Continental's new sulfuric-acid alkylation unit will boost the refinery's current daily alkylate output of 850 bbl. by nearly 1,000 bbl.

Production from an existing thermal

NELSON REFINERY CONSTRUCTION INDEX

Appears in the first issue each month.

Explanation—"News Items That Appear in Quarterly Cost Indexes," July 7, 1952, pages 105 and 106.

Compiled by W. L. Nelson—Petroleum Refinery Consultant—Tulsa.

Indexes of Individual Equipment Items—January, April, July and October.

INDEX (1946 = 100)

	1948	1949	1950	1951	Oct. 1952
Pumps, compressors, etc.	127.0	135.9	138.2	155.9	155.6
Electrical machinery	127.6	130.9	134.9	154.3	150.8
Internal combustion engines	116.9	124.8	126.0	146.1	145.8
Instruments	120.0	122.0	127.8	142.3	148.1
Heat exchangers	130.0	133.0	140.0	152.0	169.4
Miscellaneous equipment average	*122.1	*121.6	*126.2	*145.1	153.9
Materials component	139.3	143.6	149.5	164.0	167.1
Labor component	128.0	137.1	144.0	152.5	169.1
Refinery construction index	132.5	139.7	146.2	157.2	168.3

*Used in computing the Nelson Index until April 1952. These are slightly different than the average of the Miscellaneous Equipment Items shown above.

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when you consider that your valves last 3 to 5 times longer

SAVE MAN-HOURS. When a trained Desco crew with a Desco mobile unit moves on your property they are fully equipped to properly lubricate and adjust any lubricated valve in minutes, where usual methods take hours or sometime days.

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MAKE US PROVE IT! A letter will brings facts and figures that will convince you—and there's no obligation!

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polymerization unit, about 670 bbl. per day, will be augmented by production from a new cat poly plant, rated at nearly 600 bbl. per day.

Vulcan Completing 2,500-Bbl. Still at Cordova Port, Ala.

CORDOVA, Ala.—Vulcan Asphalt Refining Co. is scheduled to place a new 2,500-bbl. distillation unit on stream this week at its refinery here.

The new refinery has 75,000 bbl. of storage, excluding run-down tanks. Vulcan recently purchased a bulk terminal at Birmingham from Pure Oil Co. Cordova is about 32 miles northwest of Birmingham.

Crude for the refinery moves from the vicinity of Baxterville, Miss., by pipe line to Mobile, thence by barge to Cordova Port.

Vulcan, a new company, is headed by Max J. Lewis, president; George W. Fenton, vice president, and J. J. Crotser, secretary-treasurer.

SAE Formally Accepts New Lube Service Designations

DETROIT.—The Society of Automotive Engineers officially accepted the new crankcase-oil service designations for inclusion in the 1953 SAE Handbook at the recent annual meeting here. The Fuels and Lubricants Committee met late in the meeting primarily to advise the Technical Board on the matter and to answer any questions which arose before the latter body took final action.

During the board's meeting, all comments concerning the new designation were matters of opinion, and in the absence of any objections on technical grounds, the changes were officially adopted for the current handbook. They will be reviewed at a later date.

Refining Briefs

E. I. du Pont de Nemours & Co., Inc., has announced plans for a $4,000,000 methionine plant, near Beaumont, Tex., with construction to begin early this spring. The facilities will be operated by the company's organic-chemicals department and will go into production late in 1954.

Monsanto Chemical Co. and Heyden Chemical Corp. will build and own jointly a new methanol plant at Texas City, Tex. The plant will produce 25,000,000 gal. of methanol annually using by-product gases from Monsanto's nearby acetylene unit as feed.

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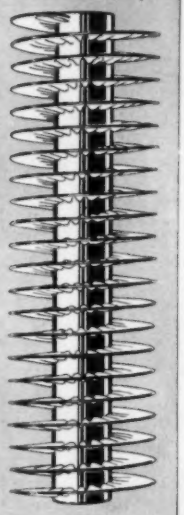

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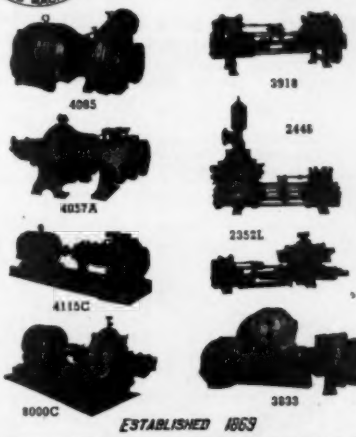

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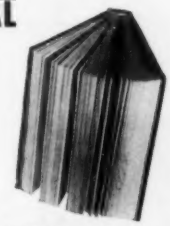

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Fifth Edition, 883 pages, 5 x 7, 630 illus., $8.50

Here is a standard, widely used manual of geological exploration and mapping especially suitable for petroleum and mining geologists and engineers. It presents methods and keys for the recognition and interpretation of land forms and structures, and explains fully how to take and record data in the field and make and interpret maps. You get valuable new information on air photography and air photogrammetry . . . underground surveying . . . electronic location, plus new material on lineation, calcareous reefs and paleogeology as well as newer mapping techniques.

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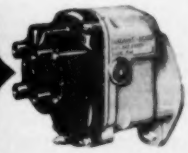

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NATURAL GAS

Texas Output in September Declines 15,000,000 M.c.f.

AUSTIN.—Total production of natural gas in Texas in September was reported by the Texas Railroad Commission last week at 411,486,893 M.c.f.—down slightly more than 15 billion cubic feet from the August total.

Volume taken by transmission lines also declined, from 266.5 billion cubic feet in August to 254.6 billion cubic feet in September. Of this amount, approximately 163 billion cubic feet, or about 64 per cent, was exported from the state.

Net gas for market totaled about 349 billion cubic feet—down 13 billion cubic feet.

Other use categories held relatively steady.

A complete breakdown of the ultimate disposition of all gas produced in the state during the month is shown in the accompanying table.

ULTIMATE DISPOSITION OF ALL REPORTED GAS PRODUCTION IN TEXAS IN SEPTEMBER

(Source: Texas Railroad Commission)

	M.c.f.	Per cent of total
Extraction loss plants*	14,499,927	3.52
Plant fuel and lease use	31,844,387	7.74
Pressure maintenance and repressuring	21,094,051	5.13
Transmission lines	254,588,925	61.87
Cycled	41,039,183	9.97
Carbon black	18,808,259	4.57
Vented	29,303,295	7.12
Plant meter difference	308,866	.08
Total gas reported†	411,486,893	
Net total for market‡	349,044,793	

*Extraction loss is shrinkage in gas volume due to removal of liquefiable hydrocarbons plus acid gas and H_2S extraction. †"Total gas reported" does not include 18,021,919 M.c.f. of gas which was used to lift oil (gas lift) and then disposed of in one of the above categories. ‡"Net total for market" is total gas produced less "pressure maintenance or repressuring," "cycled," and "plant meter difference."

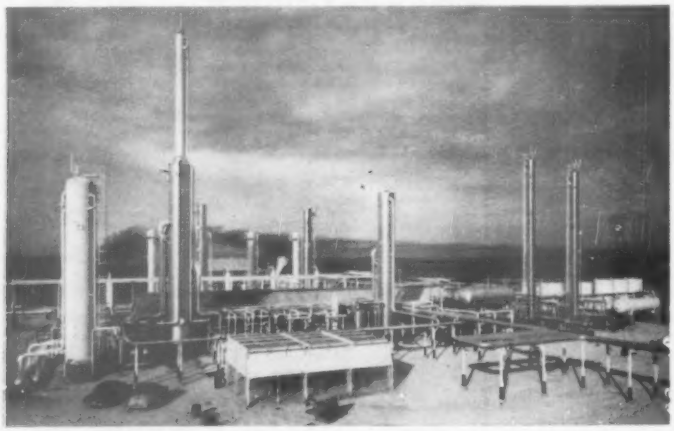
Helen Gohlke Compressor Plant Now in Operation

CORPUS CHRISTI.—The new Gohlke Gas Compressor Plant, located in the Helen Gohlke field, DeWitt and Victoria counties, Texas, is now in operation.

The new facilities are used to collect gas, previously flared, and boost its pressure to approximately 1,000 psi. for entry into a pipe line.

Three 880-hp. compressors, capable of handling 10,000,000 cu. ft. of gas per day, are used to increase the pressure of the gas, which is then cooled and dehydrated before entering the line.

Plant superintendent is C. E. Carlson of Shell Oil Co., plant operator. The installation is owned jointly by Shell, Humble Oil & Refining Co., Kirby Petroleum Co., and Monterey Oil Co. of Texas.



Desert Landmark

This is a field-processing and gas-treating plant owned by El Paso Natural Gas Co. at Jal, N. M., one of several such plants it operates in conjunction with its pipe-line activities. Shown here are fractionators, absorbers, gas treaters, and heat-transfer equipment at El Paso's Jal No. 4 plant. Lean dry gas from the plant is carried by pipe line to various western consuming centers.

Natural Gasoline

Lone Star Starts Work on New Plant in Parker County

DALLAS.—Lone Star Gas Co. has construction under way on a main-line natural-gasoline plant north of Springtown in Parker County, Texas.

Completion has been scheduled for the first of July, and the plant initially will process 45,000,000 cu. ft. of gas daily.

Feature of the plant is the utilization of existing high gas pressures in the pipe line supplying the extraction plant. The plant will have no compressors. Instead it will make use of the normally high, 500 psi. and above, pressure maintained in the pipe line.

Location about 1 mile north of Springtown is on a 12-in. main line, 30 miles northwest of Fort Worth. The plant has been designed for future expansion to handle 75,000,000 cu. ft. of gas daily and the possible addition of a booster plant. Gas for the plant will come from wells in Parker, Wise, Young, and Jack counties, and output will include natural gasoline, propane, butane, and isopentane.

L. E. Todd, superintendent of Lone Star's Katy gasoline plant at Elmore, Okla., is superintendent of construction. Don W. Hale is project engineer, and H. H. Saunders is construction foreman.

Chairmen Announced For Two N.G.A.A. Meetings

TULSA.—The program committees for the Natural Gasoline Association of America's annual convention at Houston and for the Permian basin regional meeting at Midland, Tex., will be headed by Ray A. Carter, Stanolind Oil & Gas Co., Tulsa, and S. M. Sisley, Shell Oil Co., Midland, respectively.

The annual convention is scheduled to be held in the Rice Hotel in Houston April 29-May 1. The Midland meeting will be in the Scharbauer Hotel February 27.

Planning for both programs is well advanced, according to N.G.A.A. President John F. Lynch, La Gloria Corp., Corpus Christi. It is expected, he said, that both meetings will set new attendance records.

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"NOTHING ELSE can do the jobs a BAASH-ROSS SAFETY CLAMP will handle!"

IT PROTECTS . . . drill collars, flush pipe, tubing, etc., from dropping through the rotary table.

IT LIFTS . . . casing, liners, drill collars, pipe, tubing—even twist-offs—as temporary elevators.

IT SNUBS . . . drill pipe and tubing against upward movement when cementing, working under pressure, etc.

IT PULLS . . . pipe sections and similar cylindrical products horizontally for aligning, positioning, welding.

Regular Size Safety Clamp (Type CR), above, fits diameters 3¾" to 10⅝". Large Size (Type CL) fits diameters 11½" to 15½". Extra Large Size (Type CXL) fits diameters 15½" to 21". Tubing Size (Type T) fits diameters 1⅛" to 4½".

HERE THE SAFETY CLAMP (Regular size) is used to prevent drill collars and similar flush joint equipment from dropping through slips in the table. It is ideal for use with Baash-Ross Drill Collar Slips to give **double** protection against slipping!

WIDE ADAPTABILITY

FOR LIFTING casing, pipe, liners or tubing, the Safety Clamp is equipped with lifting ears through which a sling can be fastened to substitute for elevators. The Extra Large Size shown here fits casing up to 21" in diameter!

FOR SNUBBING drill pipe and tubing, the Safety Clamp is simply inverted so the slip segments pull down instead of up. Easily-attached hold-down ears permit fastening anchoring cables with maximum speed and simplicity.

FOR PULLING pipe lines or pipe sections into alignment for welding, coupling or positioning, a Safety Clamp fastened around the pipe provides a slip-proof grip for pulling manually or mechanically.

Get Complete Details on the many ways Baash-Ross Safety Clamps can increase the safety and efficiency of your rig operations. Your local supply dealer will gladly supply full information —or write direct!

There seems to be no limit to the variety of jobs operators have figured out for the Baash-Ross Safety Clamp. Originally designed to take a quick, slip-proof grip on drill collars, liners and other flush joint equipment to prevent it from dropping through the table, it is now available in four sizes—Tubing, Regular, Large and Extra Large—to lift equipment *up* . . . or hold it *down* . . . or pull it *sideways. In fact, wherever you have a job calling for a firm grip on anything cylindrical—from only 1¼" in diameter to 21"—the Baash-Ross Safety Clamp will probably do the job easier than you ever thought possible!*

HERE'S THE GRIPPING PRINCIPLE IN A NUTSHELL

The Safety Clamp consists essentially of many individual links flexibly hinged together. Each link has a tapered slip held in retracted position by a spring. When the Clamp is tightened around the pipe—a quick and simple operation—each slip takes a firm initial grip on the surface of the pipe. As the load increases, each slip is wedged tighter, preventing any slippage between pipe and Clamp. There's no risk of crushing thin-walled pipe or damaging pipe surfaces because the grip is *uniformly distributed around the full circumference.* And since each link is interchangeable as a unit, simply adding or removing links readily adapts the Clamp to virtually any diameter pipe in common use.

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When you drill for deep pay

UNAFLO*

protects your investment

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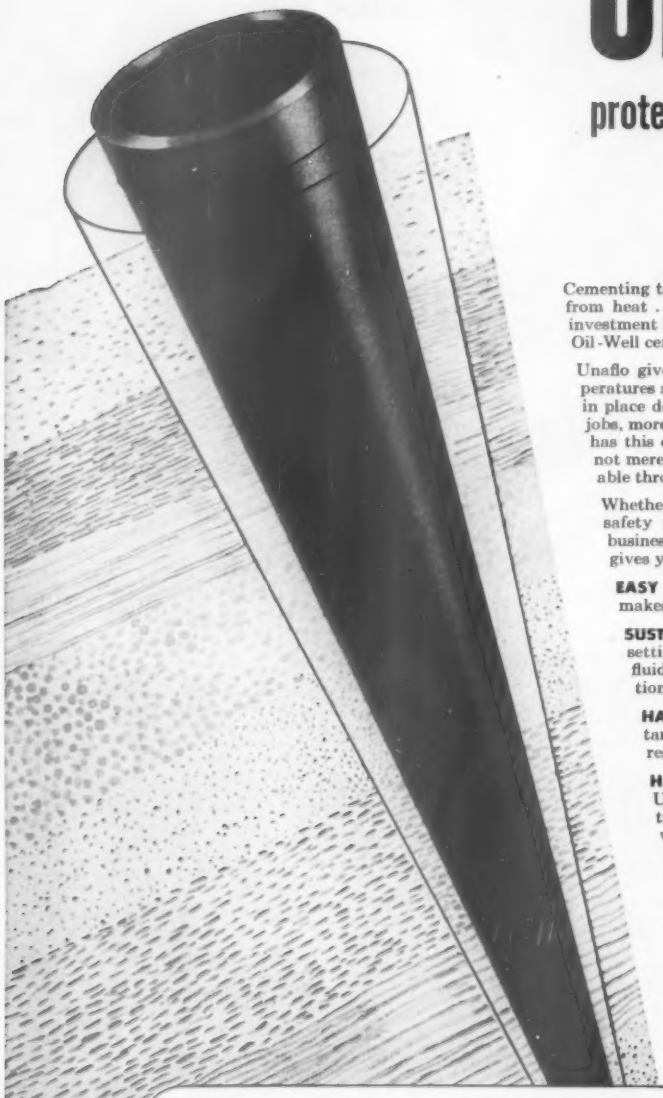

Cementing today's deeper wells brings a triple threat; from heat . . . pressure . . . unexpected delay. Your investment is safer from all three when you use Unaflo Oil-Well cement. Here's why:

Unaflo gives you *more time* under unfavorable temperatures and pressures! *More time* to get the cement in place down a long hot string . . . and on squeeze jobs, more time to wash out in emergencies. Unaflo has this extra safety factor because it's *retarded*—not merely "slow-setting." It stays fluid and pumpable through the entire retardation period.

Whether you're down deep, or want a greater safety margin on routine jobs, it's plain good business judgment to insist on the cement that gives you this reliable 3-way protection:

EASY PUMPING—Unaflo's high *initial* fluidity makes pumping easier right from the start.

SUSTAINED FLUIDITY—Unaflo isn't just "slow-setting." It's a retarded cement and *stays* fluid and pumpable throughout the retardation period.

HARDENS NORMALLY—Unaflo, after its retarded period, makes a strong, tight seal—resistant to sulfate waters.

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*"UNAFLO" is the registered trade mark of the retarded oil-well cement manufactured by Universal Atlas Cement Company

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Where's the Anadarko Basin Oil?

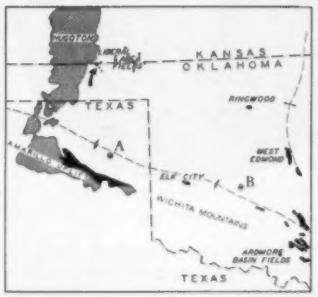
THE Anadarko basin remains one of the biggest rank wildcat areas in the United States despite the tremendous accumulations of oil and gas that have been found near its limits.

The basin fans out northwestward from a billion-barrel concentration in the Ardmore basin; it dips abruptly off a billion-barrel concentration on the north flank of the Amarillo uplift; it slopes gradually away from a billion-barrel concentration in the Nemaha "ridge" area; it lies downdip from the biggest dry-gas field in the world; and yet, only a few hundred million barrels of oil have been found within this basin whose volume of sedimentary rocks dwarfs that of the oil fields near its limits.

An area of growing prominence is that near Liberal, Kans., where numerous formations from the basal Permian through the Mississippian unconformity offer a multitude of objectives at moderate depths. Of current interest is J. M. Huber Corp. 1 Potter, 26-6n-21eCM (arrowed on sketch). This wildcat flowed 267 bbl. of oil in 6 hours through a ½-in. choke from the Pennsylvanian-Oswego at 5,640-94 ft. It is located about 3 miles northwest of the four-well Greenough pool, which also produces from the Oswego. This area of southernmost Seward and Meade counties, Kansas, and Beaver County, Oklahoma, continues to bear watching.

Another area of growing significance is southern Roberts County in the Texas Panhandle. Quinduno field (A on map) was discovered last year by Gulf Oil Corp. with a Permian-Wichita-Albany - Brown dolomite completion at about 4,000 ft. for 78 bbl. of 51°-gravity oil in 6 hours and a gas flow estimated at more than 8 M.M.c.f. daily. In addition to a deeper-pool discovery made in Pennsylvanian granite wash at about 6,735 ft., the Brown dolomite has been extended ¾ mile south, 2½ miles southeast, and 2 miles east.

Now testing, with ultimate results still wanting, is Continental Oil Co. 1 Smith (B on map) in Caddo County, Oklahoma. This wildcat was drilled to 13,545 ft. Drill-stem tests below the top of the Pennsylvanian-Deese at 11,088 ft. got only small gas shows, but tests of the Pennsylvanian-lower Hoxbar at about 9,200 ft. flowed 44°-gravity oil at various rates.



The 1 Smith, 32-10n-12w, is about 9 miles northwest of Superior Oil Co. of California 51-11 Weller, a 17,823-ft. test of the northwest - southeast-trending Fort Cobb anticline. This seismograph-mapped anticline, which covers nearly half of Township 8n-12w, was first tested by Amerada Petroleum Corp. to 10,231 ft. This well and Superior's deep test were located near the crest of the structure which shows 200 ft. of closure when mapped on a reflection horizon in the upper part of the Hoxbar. Superior's deep test was bottomed in the Pennsylvanian-Springer with an estimated 1,000 ft. to go to the top of the Mississippian and perhaps more than 10,000 ft. to basement. Superior's second well was drilled about 200 ft. down the northeast flank of the big structure to 10,983 ft. in the Pennsylvanian-Deese. Seismic work in this area has not mapped structure below the area's major unconformity which came after deposition of the Springer.

For those who believe that the deep portion of a basin offers the best place to look for big oil, the Anadarko basin presents many interesting possibilities below the upper 2,500 ft. of Permian beds. However, deep drilling with little guidance will be the rule for this area. For those who prefer multiple pays at reasonable depths when guidance is lacking, the shovel end of the basin as it crosses the Oklahoma Panhandle and climbs into Kansas appears to offer a promising area for development.

Philip C. Ingalls.

For a geophysical case history of the Fort Cobb anticline see Francis F. Campbell's paper in the October 1950 issue of Geophysics.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

COLORADO . . . Twin Oil Co. 2 Cuykendall, NW NW SW 12-2n-63w, southeastern Weld County wildcat, flowed at the rate of 3 bbl. of oil per hour from "J" sand perforations from 7,018-32 ft. on a 1-hour test. The operator has shut in the apparent discovery.

NORTH DAKOTA . . . Zack Brooks-Crawford Smith 1 Edwin Berentson, C SW SE 21-163n-80w, Turtle Mountain discovery well, Bottineau County, pumped 30 bbl. of clean oil in 9 hours following acid treatment and sand fracturing.

MISSISSIPPI . . . The second gas field in the Black Warrior basin of Northeast Mississippi has been opened with the completion of Shell Oil Co. 1 Mrs. Lee Harrington, 25-14s-6e, Monroe County. Calculated open flow potential was 4,500 M.c.f. of dry gas per day.

WEST TEXAS . . . Dan Auld 1 Timmons, northwest Lynn County Pennsylvanian reef discovery, flowed 25 bbl. of oil an hour for 5 hours through 10/64-in. choke from perforations at 9,843-64 ft., with another set from 9,803-19 ft. yet to be tested.

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Coring To Resume At Tabasco Field Test

CORPUS CHRISTI.—Houston Oil Co. of Texas and American Republics Corp. are preparing to resume coring about 7,120 ft. at 7 Temple W. West et al, in Tabasco field of Hidalgo County, after recovering condensate of drill-stem test 6,983-89 ft. Test, with tool open 10 minutes on ¼-in. chokes, developed a working pressure of 680 psi., and recovery was 210 ft. of condensate, very slightly mud-cut. Bottom hole flowing pressures were 1,730 psi., initial, and 1,900 psi. final. Shut in bottom-hole pressure was 3,975 psi. Zone tested, the Vicksburg "O" section has proved productive in one other venture in the field, same operator's 3 Temple W. West et al, completed for 14,000,000 cu. ft. of gas from perforations 9,346-44 ft. The 7 West is 933 ft. west-northwest of the oil discovery in Tabasco field, Houston-American Republics 2 Temple W. West, completed for 173 bbl. of 45.7°-gravity oil per day on perforations 6,204-14 ft. opposite the Heard sand.

With 5½-in. production string cemented to 1,313 ft., Argo Oil Corp. is preparing to perforate for tests opposite the Pettus (1,278-86) and Mirando (1,160-62) at 1 State Lease MF 32988, wildcat 16 miles west of Seven Sisters in Duval County. Hole is bottomed at 1,972 ft. Survey was run to 1,970 ft., indicating favorable conditions for completion opposite the Mirando and Pettus. Wildcat, in R. F. Neeley Survey 48, is 600 ft. southeast of J. Givlin 1 Rossen, a 1,329-ft. dry hole.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Nueces County: L. A. Douglas 1 Mrs. Ida M. Heuermann, Chas. Land Sur. 412, A-854, TD 7,400 ft., PT 74,000,000 cu. ft. of gas per day open flow, 53°-gravity, gas-oil ratio 60,000-1.

Southwestern Oil & Refining Co. 1 H. J. & W. Mattiza, Geo. H. Paul Subd., Blk. 14, TD 6,012 ft., PT 136 bbl. of oil per day, ⅛-in. choke, 40.9°-gravity oil, gas-oil ratio 600-1.

San Patricio County: Drilling & Exploration Co. 1 Joe McNair, M. G. Frazier Sur., A-118, TD 4,885 ft., IP 82 bbl. of oil per day, ⅛-in. choke, 34°-gravity oil, gas-oil ratio 472-1.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Aransas County: Sam E. Wilson, Jr. and Warlit Oil Corp. 1 W. L. Pridgen, John Smith Sur., A-187, TD 8,520 ft., dry.

Bastrop County: Gilcrease Oil Co. 1 A. K. Murchison, Jas. Stewart Sur., TD 4,205 ft., dry.

Bexar County: Joe Krchnak et al 1 Piasek Est., Jno. M. Bringer Sur., A-668, TD 1,810 ft., dry.

Frio County: A. T. Jergins & Sons, Ltd., 1 T. J. Goad, Concepcion Carrillo 161, A-155, TD 3,930 ft., dry.

Texita Oil Co. Trimark Oil Co. 1 S. B. Davies, B. L. Crouch 31/1, A-1271, TD 5,412 ft., dry.

Hidalgo County: L. M. Lockhart 2 John H. Shary Est., San Salvador del Tule Grant, TD 11,033 ft., dry.

Jim Hogg County: Sam Cunningham 2 Daniel Gutierrez, Noriecitos Grant, TD 4,065 ft., dry.

Jim Wells County: Geo. W. Graham et al 4 Mrs. Florence Ragland, Los Presenos de Abajo Grant, A-171, TD 5,206 ft., dry.

Nueces County: Arkansas Fuel Oil Co. 1 Herman Fischer et al, Gregorio Farias Sur., A-592, TD 7,208 ft., dry.

Who really owns Standard?

That old bogeyman—the Tycoon of Big Business—seems still to linger in the minds of some people. Whether or not this was ever a true picture, it is certainly false today. Standard Oil Company of California, for instance, is widely held, independent. It has its own management and shareholders. It is not connected with any of the Standard companies in the East.

The actual owners of Standard Oil Company of California now number 115,942—which is 17,000 more than just two years ago. They include 283 universities and other educational institutions; 236 churches and religious organizations; 1825 small and large businesses; 159 hospitals and other medical groups; 10,876 employees of the Company, and 102,563 other individual citizens, few of whom could be called rich. The great number of our shareholders are people like your own friends and neighbors—yourself, perhaps—mechanics, clerks, farmers, white-collar men, widows, men and women who have retired. ¶ In another sense, of course, the "owners" of Standard are our customers. You *control* the Company by your choice of brands, and you *benefit* by the quality and economy of the products we sell. The only way Standard can look after the interests of its shareholders is by making sure that Standard serves *you* well.

STANDARD OIL COMPANY OF CALIFORNIA ***plans ahead to serve you better***

Starr County: W. H. Wilson 1 T. H. Longoria et al, Survey 286, TD 7,512 ft., dry.

Travis County: G. L. Reasor 1 Jessie Ezell et al, Noel M. Bain Sur., TD 3,309 ft., dry.

Webb County: South Texas Oil & Gas Co. 1 Raul de la Garza, N. por of Sur. 261, TD 2,260 ft., dry.

Permian Basin

More Devonian Pay Logged At Magutex Extension

MIDLAND.—Humble Oil & Refining Co. 1-Q University, 2 miles east and slightly south extension to Magutex field, logged additional Devonian pay. Drill-stem test from 12,484-511 ft. flowed mud, gas and oil in 98 minutes. It was cleaned into pits for 8 minutes, then gaged 82 bbl. of 44°-gravity oil in 1 hour.

According to field sources, pipe was to be run for completion as a Devonian discovery. Total depth was 12,511 ft. and top of the Devonian was 12,458 ft. on elevation of 3,020 ft.

Magnolia Petroleum Co. completed its south offset to Magutex discovery, flowing 208 bbl. of oil a day, plus 11 bbl. of water, from Ellenburger perforations at 13,832-47 ft.

In Ector County Cities Production Co. 1-Q Cowden developed some gas and 210 ft. of half mud and oil on drill-stem test from 9,086-9,109 ft. Drilling continued below 9,218 ft. at last report.

Phillips Petroleum Co. 1 Ratliff, south offset to the Mac Boring-Wolfcamp discovery, returned its water blanket heavily cut with oil and 360 ft. of heavily oil and gas-cut mud on a drill-stem test in limestone at 9,526-52 ft.

Operators have been watching development of Dan Auld 1 J. A. Timmons, northwest Lynn County Pennsylvanian reef prospect. At last report, perforations had been made between 9,803-19 and 9,843-64 ft. With packer between the two sets of holes, acid treatment and swabbing started the lower set flowing an estimated 25 bbl. of oil an hour through 10/64-in. choke. Flowing tubing pressure was 750 psi. and there was no formation water. Following further tests on both sections, the well will be completed as a discovery. First lime stringers were reported at 9,772 ft. on elevation of 3,256 ft., and top of solid reef lime at 9,800 ft.

In the Texas Panhandle and 2 miles east of Quinduno field of Roberts County, Gulf Oil Corp. 1 McCuistion completed as an extension to the lower Albany pay. Potential of 351 bbl. of 50°-gravity oil was based on a 7½-hour test of 109.75 bbl. oil through ½-in. tubing choke. Completion perforations were from 4,110-13 ft.

Sinclair Oil & Gas Co. entered the area with location for 1 M. W. O'Laughlin, 157-M2-BS&F Survey, which is a south offset to Shamrock Oil & Gas Co. 2 Maddox, recently completed south extension to Quinduno field.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Andrews County: Magnolia Petroleum Co. 1-CA Fasken, 30-40-T3N-G&MMBA, TD 12,883 ft., elev. 3,014 ft., Devonian 12,736 ft., pay 12,738 ft., IP 200 bbl. 56°-gravity oil, 6/64-in. choke, TP 1,575 psi., GOR 128 cu. ft.

Runnels County: G. B. Cree 3 H. A. Stephens, C. A. Parker Sur. 16, TD 4,078 ft., elev. 2,015 ft., lower Fry sand pay 3,773 ft., IP 384 bbl. 42°-gravity oil, 20/64-in. choke, TP 550 psi., GOR 1,226 cu. ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Andrews County: Great Western Drilling Co. 1-A Mayhew, 21-A51-PSL, dry, TD 9,946 ft., elev. 3,265 ft., Pennsylvanian 8,410 ft., Devonian 9,670 ft.

Culberson County: Continental Oil Co. 1 J. B. Foster, 24-88-PSL, dry, TD 5,272 ft., elev. 4,144 ft., Ellenburger 4,850 ft.

Howard County: Greenbrier Oil Co. 1 Mrs. Avas Guffee, 68-20-LNC Sur., dry, TD 268 ft.

McCulloch County: W. N. Coats 2-A Hirshfield Est., J. Patton Sur. 1,080, dry, TD 800 ft.

Pecos County: Mrs. C. Stofford Lewis 1 Arnold Ranch, 30-1-H&TC, dry, TD 2,200 ft.

Runnels County: H. S. Dew and Ray Culberson 1 McAuley, Sec. 359, Chas. Lockhart Sur. 316, dry, TD 5,300 ft.

J. J. Lynn 1 Enoch Johnson, Sec. 177, H&TB, dry, TD 4,310 ft., Morris sand 3,599 ft., Gardner 3,927 ft.

R. J. O'Connel 1 Frieda Piel, J. Ankerhoffer Sur. 416, dry, TD 4,176 ft.

Reeves County: Jay M. Floyd 1 T. H. Harrison, 36-1-H&GN, dry, TD 3,710 ft., elev. 2,759 ft., Delaware sand 3,687 ft.

Sutton County: C. L. Norsworthy Jr. 2 Shannon Clarkson, 70-14-TW&NG, dry, TD 6,886 ft., elev. 2,287 ft., Strawn 5,242 ft., Ellenburger 6,610 ft.

TEXAS PANHANDLE (DISTRICT 10) WILDCAT FAILURES

Childress County: Claud B. Hamill 1 McSpadden, 379-H-W&NW, 12 miles E Childress, dry, TD 6,517 ft., elev. 1,615 ft., Cisco 3,518 ft., Canyon 4,512 ft., Canyon lime 5,363 ft., Strawn 5,845 ft.

Hutchinson County: Gulf Oil Corp. 1 Williams, 4-M23-TCRR, stratigraphic test 2 miles SE Pringle, dry, TD 3,240 ft.

Wheeler County: Sun Oil Co. 1 Burke, 57-A8-H&GN, stratigraphic test 2½ miles W Wheeler, dry, TD 4,233 ft.

SOUTHEASTERN NEW MEXICO

Skelly Oil Co. 1-R Mexico-State, Pennsylvanian discovery southwest of Townsend-Wolfcamp field, 18-16s-35e, has been completed for 1,302 bbl. of oil a day. The gage was through ¾-in. choke on perforations from 10,705-25 ft.

Magnolia Petroleum Co. announced location for 1 Shaw-Federal, Devonian wildcat in 6-13s-31e, west of Caprock field. Projected depth was 12,000 ft.

Amerada Petroleum Corp. 1 Crowley, extension try north of Moore Devonian field, has been abandoned following a test of the Devonian from 10,995-11,025 ft. Recovery was water blanket and sulfur water with no shows.

SOUTHEAST NEW MEXICO SUCCESSFUL WILDCAT

Lea County: The Texas Co. 1 State BQ, NCT-1, 2-14s-33e, TD 10,080 ft., elev. 4,200 ft., pay 9,992 ft., IP pumped 50 bbl. 42°-gravity oil.

SOUTHEAST NEW MEXICO WILDCAT FAILURES

Chaves County: Hassie Hunt Trust 1-A Manry Elliott, 22-11s-31e, dry, TD 356 ft.

DeBaca County: Cities Production Co. 1 Hobson, 12-1s-27e, dry, TD 6,742 ft., elev. 4,279 ft., pre-Cambrian 6,725 ft.

Eddy County: Carper Drilling Co. 1 American Republics-Federal, 27-20s-26e, dry, TD 2,117 ft., elev. 3,226 ft., San Andres 1,282 ft.

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Lea County: El Capitan Oil Co. 1 State, 2-9s-35e, dry, TD 9,862 ft., elev. 4,136 ft., Abo 7,680 ft., Bough 9,597 ft.

Ellis A. Hall 1 State, 23-22s-35e, dry, TD 8,160 ft., elev. 3,613 ft., Delaware sand 5,880 ft., Bone Springs 7,960 ft.

Lawton Oil Corp. 1 J. H. Simpson, 3-13s-37e, dry, TD 12,551 ft., elev. 3,896 ft., Pennsylvanian 9,694 ft., Mississippian 12,020 ft.

Lawton Oil Corp. 4 State-Atlantic, 14-13s-33e, dry, TD 10,008 ft., elev. 4,257 ft., San Andres 3,988 ft., Abo 7,590 ft.

Eastern Texas

Long-Planned Deep Test Scheduled For Ellis

DALLAS.—Ellis County was reported in line for a long-planned deep test, and according to reports, work has been scheduled for immediate drilling. The new wildcat will be drilled by Johnny Mitchell, Houston operator, as the 1 Nora Anderson. Location is in the W. H. H. Bradford Survey, A-92, 2 miles northwest of Midlothian. Projected depth of 10,000 ft. is expected to explore the Ellenburger. Location was made on a subsurface prospect. Outcome of the rank wildcat will effect several thousands of acres now under lease in the county.

Drilling was reported under way at O. C. Profitt and Murray Oil Co. 1 J. W. Henry, 6,500-ft. Ellenburger wildcat 5 miles south of Mosheim in Bosque County.

In Leon County, Rancho Oil Co. 1 Shaddix, wildcat 10 miles southeast of Centerville, was drilling below 5,035 ft. Projected depth was 7,700 ft.

W. B. Hinton was moving in last week to drill 1 R. W. Carter, Limestone County wildcat 9 miles northwest of Thornton. Location for the 5,100-ft. test is in the Thomas Stevens Survey, A-499.

EAST TEXAS (DISTRICTS 5 AND 6) SUCCESSFUL WILDCAT

Smith County: Sun Oil Co. 1 Hitts Lake, John Lane Sur., 5½ miles N Tyler, TD 7,244 ft., elev. 415 ft., Paluxy pay 7,176 ft., IP 230 bbl. 27°-gravity oil, ⅛-in. choke, TP 430 psi., GOR 59 cu. ft.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

Cherokee County: Bill Tipton 1 Reynolds, J. M. Doherty Sur., dry, TD 5,200 ft.

Hopkins County: E. L. Howard 1 Elbert Voss, Eli Voss Sur., A-1,012, dry, TD 5,300 ft.

Houston County: Trans-Tex Drilling Co. 1 Mrs. Luther Brown, Stephen Rogers Sur., A-75, dry, TD 5,840 ft.

Limestone County: Burk Royalty Co. 1 R. Kennedy, P. Varela Sur., dry, TD 5,023 ft.

Marion County: L. A. Grelling 1 Birdie Simpson, John H. Johnson Sur., A-222, dry, TD 4,000 ft.

Morris County: B. G. Byars 3 Paul Pewitt, G. W. Dyer Sur., dry, TD 4,725 ft.

Rusk County: Sells Petroleum Co. 1 Flanagan Unit, Michael Hussner Sur., dry, TD 6,806 ft., elev. 269 ft., Paluxy 3,797 ft., Glen Rose Texas 4,095 ft., Glen Rose Louisiana 4,857 ft., James 6,244 ft.

Van Zandt County: Gibson Drilling Co. 1 H. P. McMakin, James Hutton Sur., dry, TD 1,700 ft., elev. 336 ft., Nacatoch 1,648 ft.

Wood County: Kelley Bruce 1 F. W. Sheppard Est., H. Nelson Sur., A-431, dry, 5,223 ft.

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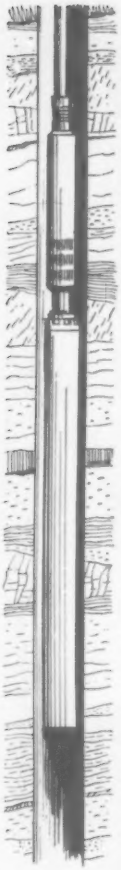

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North-Central Texas

Conglomerate Extension Finaled In Montague

WICHITA FALLS.—Montague County listed one conglomerate extension completed and another showing oil.

McQueen & Clevenger 1 Jackson, Section 26, Limestone CSL, completed as a northeast extension to Underwood-Ray Bend conglomerate field, flowing 252 bbl. of oil a day through 16/64-in. choke. Pay section was perforated at 6,116-28 ft.

In the new Waggoner conglomerate field, 1½ miles northeast of Montague and southeast of the Engle Strawn area, Elm Oil Co. 1 Pollard developed 25 ft. of slightly oil-cut mud on a test at 6,149-61 ft., then flowed oil on its second test, from 6,283-6,302 ft. The latter test had oil at the top in 33 minutes but no estimate was made of the flow.

In Knox County, Sohio Petroleum Co. and the Chicago Corp. 1 F. W. Thorman, Strawn sand discovery 4 miles north of Katz Strawn field, prepared to complete after flowing oil at the rate of 15 bbl. hourly through ¼-in. choke on perforations at 5,129-59 ft. New test for Knox County was reported as Thomas D. Humphrey & Sons 3 Mary Bush, 6,000-ft. wildcat in the E. Boren Survey, 6 miles west of Knox City.

Nolan County had a new Ellenburger discovery in the completion stage at J. D. Wrather Jr. 1 J. E. Davis, 3 miles northeast of Blackwell. First test at 6,530-70 ft., tentatively called the Ellenburger detrital, recovered 780 ft. of oil in the pipe. A 2½-hour test at 6,573-95 ft. recovered 150 ft. of free oil and heavily oil and gas-cut mud, and at 6,595-6,615 ft. oil reached the surface in 25 minutes. Operators reversed the oil out of the pipe and prepared to complete.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Brown County: T. J. Carter 2 Chambers, Sec. 147, G. Logan Sur., TD 1,340 ft., elev. 1,541 ft., pay 1,301 ft., IP 195 bbl. oil.

Dunn, Craig and Kerby 2 E. C. Byrd, Sec. 282, Stephen Jones Sur., TD 1,397 ft., elev. 1,553 ft., pay 1,380 ft., IP pumped 40.7 bbl. 42°-gravity oil.

Coleman County: Miller & Banks 1 G. D. Odom, Sec. 739, A. Quigley Sur., TD 2,152 ft., pay 2,103 ft., IP 121 bbl. 45°-gravity oil, 16/64-in. choke, TP 180 psi., GOR 800 cu. ft.

Horace E. White 4 C. B. Moseley, Sec. 40, HT&B Sur., TD 3,416 ft., pay 3,362 ft., IP 312 bbl. 44°-gravity oil, 20/64-in. choke, TP 125 psi., GOR 400 cu. ft.

Cooke County: Kay Kimbell 1 Jim Titch, Blk. 3, Fannin CSL, TD 4,583 ft., elev. 809 ft., pay 4,567 ft., IP 105 bbl. 35°-gravity oil, 10/64-in. choke, TP 425 psi., GOR 90 cu. ft.

Kay Kimbell 1 J. E. Westbrook, Henry Baker Sur., A-100, TD 4,809 ft., pay 4,801 ft., IP 106 bbl. 26°-gravity oil, TP 200 psi., GOR 60 cu. ft.

Grayson County: Sinclair Oil & Gas Co. 1 J. F. Godwin, W. C. Caruthers Sur., A-209, TD 8,025 ft., elev. 654 ft., sand pay 7,114 ft., IP 256 bbl. 33°-gravity oil, 7/16-in. choke, TP 30 psi., GOR 464 cu. ft.

Haskell County: Pan American Production Co. 1-B Livengood, 8-8-A, W. Terrell Sur., TD 2,837 ft., pay 2,824 ft., IP pumped 87 bbl. 37°-gravity oil.

Jack County: Russell Maguire 1 Craft, G. Gardinas Sur., A-125, TD 5,740 ft., elev. 114 ft., conglomerate pay 5,722 ft., IP

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76.5 bbl. 47°-gravity oil, 16/64-in. choke, TP 450 psi., GOR 1,800 cu. ft.

Russell Maguire 1 Lewis Johnson, W. Murray Sur., A-376, TD 5,761 ft., conglomerate pay 5,729 ft., IP 301 bbl. 42°-gravity oil, 20/64-in choke, TP 300 psi., GOR 500 cu. ft.

Taylor County: Robert Mims Trustee 1 H. C. Chambless, 41-19-T&P, TD 5,046 ft., pay 4,970 ft., IP 114 bbl. 43°-gravity oil, 16/64-in. choke, TP 200 psi., GOR 1,278 cu. ft.

Throckmorton County: Noel Pautsky 1 W. R. Tharp, Sec. 3,029, TE&L Sur., TD 3,490 ft., pay 3,484 ft., IP pumped 30.6 bbl. 40°-gravity oil.

Young County: Midland Gasoline Co. 1 S. C. Shanafelt, H. A. McComber Sur., A-2,168, TD 4,251 ft., Bryson sand pay 3,023 ft., IP 216 bbl. 41°-gravity oil, 40/64-in. choke, TP 60 psi., GOR 720 cu. ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: L. T. Burns 1-L Turbeville Deep, George Bond Sur., A-27, dry, TD 3,946 ft.

Chapman & McFarlin 1 Turbeville, Blk. 136, J. W. Snell Sur., A-386, dry, TD 3,874 ft.

Reznick & Cassidy 1 Virgil Seay, Blk. 63, J. W. Harris Subd., dry, TD 1,602 ft., Gunsight 1,361 ft.

Baylor County: Lowry Operating Co. 1 B. M. Higgins, C. Winters Sur., A-558, dry, TD 5,503 ft.

H. W. Porter 1 Jessie Lee Hargrave, Blk. 3,138, TE&L Sur., A-544, dry, TD 1,448 ft.

Callahan County: Ungren & Frazier 9 Elma Jackson, Sec. 16, ETRR Sur., dry, TD 1,280 ft.

Coleman County: Anzac Oil Corp. 1 R. O. Mathews, 274-101-C, T. Pendleton Sur., dry, TD 1,925 ft.

Davis, McDaniel & Beecherl 1 E. W. Gill, Sec. 71, J. Armandaris Sur., dry, TD 1,656 ft., elev. 1,419 ft., Barnett 1,525 ft., Ellenburger 1,598 ft.

Cooke County: S. D. Johnson 2-A W. R. Cannon, J. Bradshaw Sur., A-31, dry, TD 2,860 ft.

Haskell County: C. M. Ashby 1 W. E. Bland, Sec. 64, M. Dunn Sur., A-120, dry, TD 4,981 ft.

G. E. Hubbard & Son 1 J. S. Reeves, Blk. 258, M. Longorie Sur., dry, TD 3,892 ft.

W. J. Rhodes and V. C. Perini Jr. 1 Barney Arnold, 2-2-T&NO, dry, TD 2,997 ft., elev. 1,734 ft., Saddle Creek 1,947 ft.

Jack County: Hale & West 1 Christian, Lot 9, Margaret Rockerfellow Sur., A-484, dry, TD 3,938 ft.

Russell Maguire 1 Annie Avery, J. P. Kemp Sur., A-322, dry, TD 5,032 ft.

Russell Maguire 1 Gladys Johnson, W. Thompson Sur., A-608, dry, TD 5,168 ft., Marble Falls 5,151 ft.

Meeker and Billingsley et al 1 Mrs. D. C. Clayton, deep test in Bryson field, Lewis Knight Sur., A-324, dry, TD 4,528 ft.

Walter L. Plemons Production Co. 1 J. R. Ramzy, J. M. Brimhall Sur., dry, TD 5,346 ft.

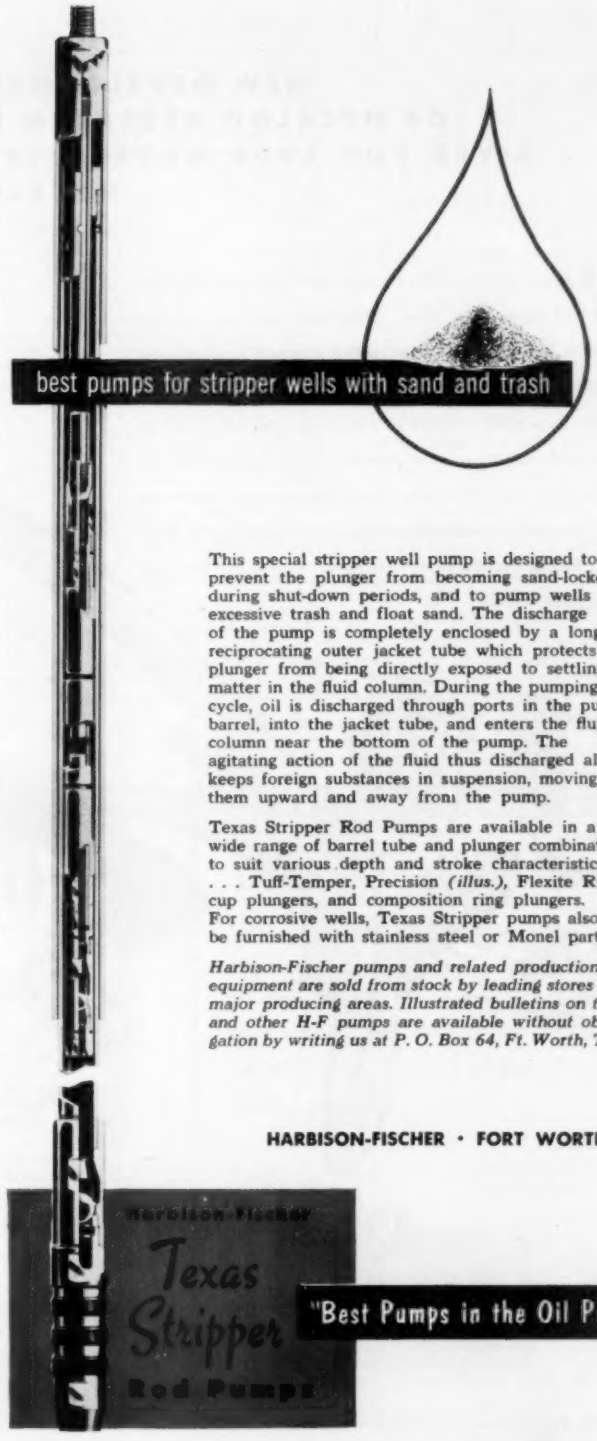
Frank Wood Associates 1-C Dixson, J. Stoneman Sur., dry, TD 3,639 ft.

Knox County: An-Son Petroleum Co. 1 Walling, 95-2-D&WRR, dry, TD 5,908 ft., Caddo 5,558 ft., conglomerate 5,779 ft.

Montague County: T. F. Hunter 1 George N. Dill, F. Secrest Sur., A-665, dry, TD 4,129 ft., Ellenburger 4,080 ft.

Russell Maguire 1 S. D. Howard, N. Kimbrough Sur., A-406, dry, TD 6,483 ft., Barnett shale 6,456 ft.

Miami Operating Co. 1 C. F. Phillips, V. P.



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Mathews Sur., A-557, dry, TD 7,251 ft., elev. 1,130 ft., Palo Pinto 2,960 ft.

Miami Operating Co. 1 Wilmer Seay, Abel Beason Sur., A-20, dry, TD 6,025 ft.

Shackelford County: Woodley Petroleum Co. 1 John D. Windham, 88-12-T&P, dry, TD 3,847 ft.

Stonewall County: G. E. Kadene & Sons 1 Arvillia Smith, 271-D-H&TC, dry, TD 6,652 ft.

Wilbarger County: Quinn & Adams 1 A. J. Diffie, 60-14-H&TC, dry, TD 4,068 ft.

Young County: Fryer & Hansen Drilling Co. 1 L. L. Evans, G. M. Cottle Sur., A-65, dry, TD 4,508 ft.

Canadian Fields

Viking Discovery Listed In Neerlandia Area

CALGARY.—Mountain Drilling Co., Ltd., Winnett Petroleums, Ltd., and Amerada Petroleum Corp. have discovered crude oil in the Viking sand at an exploratory driller in the Neerlandia area of Alberta, 62 miles northwest of Edmonton.

The discovery well, Mountain Drilling 1 Neerlandia, LSD 8, 17-62-3w5, is 12 miles southwest of Imperial 1 Jarvie capped gas discovery well, and about that same distance north of Union Oil of California's 1 Mellowdale gas discovery. First encouragement came during 45 minute drill-stem test from 2,650-2,701 ft. Natural gas flowed to the surface in 2 minutes, at rate 886,000 cu. ft. daily, and recovery was 520 ft. of oil and 60 ft. of drilling mud. Gravity of the is 29.9°. Hole was carried down to 3,630 ft., plugged back and string of 7-in. casing was set to 2,744 ft.

First production tests have been carried out from the perforated interval 2,679-2,700 ft. Latest swab tests yielded 20 bbl. of oil in 45 minutes, and pump potential has been estimated at 350 bbl. daily.

Top of the Viking sand pay zone has not as yet been definitely determined, but it is believed that the discovery well has about 15 ft. of oil sand present above 2,700 ft. A second oil sand is also believed to be present, in the interval 2,708-40 ft., but that zone has not been tested as yet.

Canadian Gulf Oil Co. has obtained a natural gas flow rate in excess of 3,000,000 cu. ft. daily during initial drill-stem test in the gas cap in top of D2 Devonian zone at its extension venture in the Drumheller area of southern Alberta. The well, being drilled in an effort to extend the D2 oil-producing limits at West Drumheller, is continuing to core and test.

The well, Gulf 11 Jackson, LSD 11, 1-30-21w4, is about 1 mile north-northeast of the Mazal-Drumheller D2 oil discovery well and 57 miles northeast of Calgary. D2 zone was encountered at 5,494 ft., or 2,685 ft. below sea level. Initial drill-stem test, from 5,492-5,502 ft., flowed gas to the surface in 2½ minutes, at maximum rate 3,380,000 cu. ft. daily. Recovery during the 30-minute test was 15 ft. of gas-cut mud. Testing is continuing at 5,520 ft.

Union Oil Co. of California penetrated approximately 90 ft. of Viking natural gas bearing zone in two sands at its venture in the Legal area of central Alberta prior to entering formation water. This well, wildcatting for crude oil, is about 1 mile from Viking gas wells in the area, 6 miles east of Viking oil wells and 23 miles north of Edmonton. Hole is scheduled to go down as a test to and including the Cooking Lake formation, to around 5,000 ft.

The well, Union 1 Fairydel, LSD 3, 21-57-24w4, contacted the Viking sand at 2,640 ft., or 318 ft. subsea, while the main section of the Viking came in at 2,708 ft., or 386 ft. below sea level. Viking drill-stem tests flowed natural gas at rates up to 5,700,000 cu. ft. daily.

ALBERTA WILDCAT FAILURES

Baysel-Selbay 4-10 Acadia, LSD 4, 10-24-5w4, TD 3,664 ft.

Old Smoky 1 Lawrence, LSD 10, 21-30-13w4, TD 5,400 ft.

Northern-Devon-Concord-Seaboard 1 Hondo, LSD 3, 28-70-24w4, TD 3,848 ft.

Western 25-11 Suffield, LSD 11, 25-14-9w4, TD 1,260 ft.

Husky 1 Michel, LSD 13, 2-54-27w4, TD 6,194 ft.

SASKATCHEWAN WILDCAT FAILURE

Canada Southern 7-29 Summit, LSD 7, 29-34-26w3, TD 2,855 ft.

MANITOBA WILDCAT FAILURE

Baysel-Cal Standard 3-27 Sharp Lake, LSD 3, 27-1-22w1, TD 3,813 ft.

EASTERN CANADA

Ontario.—A well drilled by Imperial Oil, Ltd., in the Kimball area in Moore Township, Lambton County, a few miles south of Sarnia, which got strong showings of gas in December, has been completed with a measured production of 39,000,000 cu. ft. open flow. Production comes from the Guelph-Niagara and related formations. The location is in the same general area as Imperial 1 Payne, completed two years ago as

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Oklahoma

Beaver County Strike Reports Good Hourly Flow

A NEW oil discovery or extension 3 miles northwest of Greenough pool in Oklahoma's Beaver County Panhandle area was tested for a flow of 38½ to 67 bbl. of oil per hour. The possible new field opener is J. M. Huber's 1 Potter in the C SE NW 26-6n-21eCM. Crews swabbed 16 bbl. of oil per hour natural for several hours from lower Oswego lime pay in open hole from 5,640-94 ft. The well kicked off to flow 67 bbl. of oil in the first hour following acid treatment through 1-in. tubing choke. Through ½-in. tubing choke the well then flowed hourly as follows: 49½, 47, 47, 36, and 38½ bbl. The well is now shut-in with tankage filled. The new discovery is located 1 mile southeast of Morrow sand gas-distillate production in Light-Liberal field, containing 11 producers.

Elsewhere in Beaver County, more than a mile southwest of Greenough pool, Carter Oil Co. has an indicated Morrow sand gas-distillate strike at 1 Tretbar, C NW NE 7-5n-22eCM. On drill-stem test from 6,606-31 ft. in the Morrow, open 30 minutes, the well flowed gas in 2 minutes at the rate of 10,000 M.c.f. per day. Recovery was 1,470 ft. of slightly gas-cut mud with some distillate. This indicated discovery is located about 5 miles southeast of the Light-Liberal development. The new strike is also located 2 miles north of Floris pool, producing from the Marmaton and Chester lime.

A 100-bbl. per hour well has expanded Haydenville pool. Frank B. Murte & Son 2 Martin, SE SW SW 22-13n-10e, recovered load oil following formation fracturing treatment and flowed 100 bbl. of oil per hour from 5 ft. of open hole in the Dutcher sand from 2,810-15 ft. Following the discovery of West Haydenville pool about 2½ miles west development on the east side of Haydenville pool was recently renewed. This area is in northeastern Okfuskee County.

Oil string casing has been set in a possible Pawnee County pool opener. Harry J. Schafer et al 1 Meeker, SE SE SE 33-21n-5e, has 7-in. casing set at 3,110 ft. A drill-stem test at 3,109-29 ft. in Prue sand, open 1 hour, recovered 90 ft. of gas and oil-cut mud and 95 ft. of very heavily oil-cut mud with some free oil. Location of the prospective discovery is 1 mile west and about 1 mile south of North Bryan pool, producing from the Red Fork sand.

OKLAHOMA SUCCESSFUL WILDCATS

Garvin County: Nelson-Spain Drilling Co. 1 Leach, NE NE NE 7-3n-1w, flowed 10 bbl. of oil from sand 6,410-24 ft., TD 8,511 ft.

Logan County: United Transports and Ashland Oil & Refining Co. 1 Byers, NW NW SW 1-19n-3w, flowed 331 bbl. of oil from unconformity 5,631-40 ft., TD 5,995 ft., PBTD 5,660 ft., 40.4°-gravity oil.

Noble County: D&L Oil Co. 1 O'Donnell, NE NE NE 12-23n-2w, pumped 18 bbl. of oil from lower Layton 3,662-73 ft., TD 3,679 ft., 41°-gravity oil, PBTD 3,673 ft.

Pottawatomie County: Kerr-McGee Oil Industries, Inc. and Phillips Petroleum Co. 1 Villines, SW SE NE 31-6n-2e, flowed 148 bbl. of oil from Trenton 5,379-5,570 ft., TD 5,792 ft., 37°-gravity oil.

OKLAHOMA WILDCAT FAILURES

Cotton County: E. B. Killingsworth 1 Bost, NW NW NW 23-3s-10w, dry, TD 2,580 ft.

Dewey County: Continental Oil Co. et al 1 Eunice Meat, C NW SE 3-19s-16w, dry, TD 8,751 ft.

Grady County: Pioneer Oil Co. 1 Rockhold, NW NE NW 19-4n-8w, dry, TD 2,520 ft.

Jefferson County: Falcon-Seaboard 1 Lawrence, NW SW SE 11-4s-4w, dry, TD 3,730 ft.

Lincoln County: Mid-Continent Petroleum Corp. 1 Hall, NW NW SE 17-12n-4e, dry, TD 5,490 ft.

Kingwood Oil Co. 1 O'Keefe, NW NW SE 34-14n-2e, dry, TD 4,852 ft.

Arthur Finston 1 Skaggs, NW NW SW 17-15n-3e, dry, TD 5,212 ft.

Love County: Kewanee Oil Co. 1 Sparks, SW NW SW 7-6s-2w, dry, TD 7,650 ft.

Noble County: Russell Maguire 1 State, NE NE NW 13-24n-2w, dry, TD 4,827 ft.

Leslie A. Drew 1 Drew-Donohue, NE NE NW 27-24n-2w, dry, TD 4,752 ft.

Osage County: Fitchhugh & Wimmer 1 Osage, NW NW SW 27-24n-4e, dry, TD 3,489 ft.

Johnson & Gill 1 St. John's School, SW SW SW 34-25n-7e, dry, TD 2,656 ft.

Pawnee County: D&L Oil Co. et al 1 Wilkey, NE NE NE 20-21n-5e, dry, TD 3,556 ft.

Pottawatomie County: Parker Drilling Co. and N. B. Hunt 1 Bradenburg, NW NE SE 23-7n-3e, dry, TD 4,830 ft.

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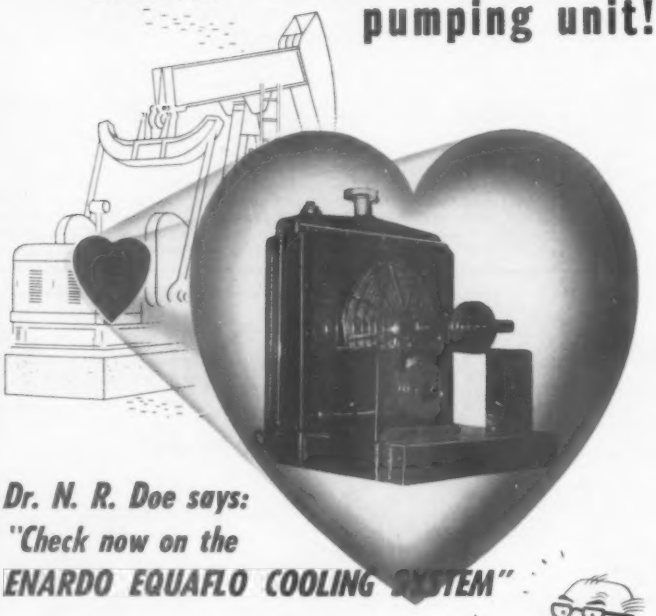

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Stephens County: Dennis F. Smith 1 Rathbun, N½ NE SE NE 10-3s-9w, dry, TD 2,508 ft.

Louisiana-Ark.

Seven Locations Spotted In New Hogg Sand Area

SHREVEPORT.—Operators have made location for seven new tests in the new Hogg sand development in Stephens field, Ouachita County. Sneed Brothers of Bossier City will operate five of the new tests, the 2, 3, 4, 5, and 6 J. H. Hughes in sections 20 and 29 of 15-19w. Sneed Brothers began this new play early in January by completing 1 J. H. Hughes in the C NW SE NW 29-15s-19w for 169 bbl. of oil per day from Hogg sand perforations at 3,185-91 ft. McAlester Fuel Co. will drill the other two Hogg sand tests, both in Section 29.

Louisiana.—Pan Am Southern Corp. staked location on a proposed Travis Peak wildcat 3½ miles southeast of Springhill in northern Webster Parish. The 1 J. M. Browning et al is located in the C SW SW 28-23n-10w, and production will be sought to depth of 7,100 ft., the depth of production in Redland field 13 miles to the west in Bossier Parish.

At the deep test in Monroe field American Republics Corp. tested salt water with a show of oil in the Smackover at 1 Olin-Interstate ARC fee, 20-21n-3e, Union Parish. This test is being closely watched as a possible Smackover discovery 33 miles southeast of the nearest Smackover production.

LOUISIANA WILDCAT FAILURE

Concordia Parish: Justiss-Mears Oil Co. 1 Link, 29-8n-7e, dry, TD 6,020 ft.

ARKANSAS WILDCAT FAILURES

Ouachita County: W. H. Bryant et al 1 Walker "A," C NW SW SE 9-14s-18w, dry, TD 2,036 ft.

Phillips County: Oil & Gas Development Associates 1 McCann, NWc NE NE 25-4s-1e, dry, TD 3,000 ft.

Union County: The California Co. 1 Smith, C NW SE 29-18s-17w, dry, TD 8,304 ft.

South Louisiana

Final Gage Run At Acadia Parish Discovery

NEW ORLEANS.—Bates & Cornell and Texas Crude Oil Co. ran final gage at the 1 Loewer Langefield unit flowing 70 bbl. of 53.6°-gravity condensate and 1,380,000 cu. ft. of gas daily from perforations near 9,735-60 ft., in the Homeseeker "C" sand. Flowing pressure on tubing was 3,400 psi., gas-condensate ratio 19,870-1. The exact footage on perforations have not been learned; however, completion is in the Homeseeker "C" formation, and a drill-stem test in the aforementioned interval recovered high gravity oil and gas. Discovery is bottomed at 10,315 ft., 5-in. liner cemented to that point. This discovery is situated south of South Bayou Mallet field and Nowata field of Acadia Parish, separated from these producing areas by fault. Drill site is from northeast corner of Section 32, 1,962.54 ft. south and 330 ft. west to location in Section 32-7s-1e.

McCauley and McCauley, Houston, opened a new oil field about 1 mile northeast of nearest production in Bayou Choupique field of Calcasieu Parish. It is the 1 W. Sam Vincent, Section 16-11s-10w. With total depth 9,515 ft., casing was cemented to 8,750 ft., perforated 8,629-35 ft. for completion. A potential gage has not been completed; however, well was producing at rate of about 140 bbl. of oil per day.

Ted Weiner has tested prolific oil flow at his 3 Wylie, a new oil discovery on the Southeast Gibson Prospect of Terrebonne Parish, effecting from a 6-ft. sand in perforations 9,640-46 ft. The 297 bbl. gage was made through a 10/64-in. choke, tubing pressure 1,320 psi., gas oil ratio 548-1, showing no formation water. Well is bottomed at 10,612 ft., has casing cemented to 10,600 ft. 5 pays were logged in this discovery, allowing total of 55 ft. net pay. Before plugging back from total depth to test in the 9,600 ft. sand above, Weiner perforated in a gas sand from 10,568-69 ft., finding gas-condensate production. Flow from that section was rated at 53 bbl. condensate and 368,000 cu. ft. gas daily on 12/64-in. choke, gas-condensate ratio 6,928-1, Tubing pressure 3,400 psi. Well is located in Section 84-17s-16e.

SOUTH LOUISIANA WILDCAT FAILURES

Acadia Parish: Union Sulphur & Oil Corp. 1 Leonie D. Thibodeaux, Sec. 74-7s-2e, TD 10,477 ft., dry.

Cameron Parish: Continental Oil Co. 1 Petty-Weber, Sec. 28-12s-3w, TD 11,098 ft., dry.

Plaquemines Parish: The California Co. 1 La. Citrus 4, Sec. 12-17s-26e, TD 11,500 ft., dry.

The California Co. 1 La. State 2122, W. Battledore area, TD 10,012 ft., dry.

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Mississippi

New Gas Field Opened In Northeast Mississippi

JACKSON.—The second gas field in the Black Warrior basin of northeast Mississippi has been opened with the completion of the Shell Oil Co. 1 Mrs. Lee Harrington, Section 25-14s-6e, Monroe County. Calculated open flow potential was 4,500,000 cu. ft. of dry gas per day. Completion is from open hole 3,505-32 ft. in the top part of the Sanders (Chester) sand zone. It will be recalled that during final tests the daily rate of flow ranged from 3,020,000 cu. ft. of gas through ½-in. choke with tubing pressure 810 psi. to 1,075,000 cu. ft. of gas through 12/64-in. choke with tubing pressure 1,150 psi. No water was produced during these tests and shut in tubing pressure was 1,450 psi. This test was drilled on a block of approximately 10,000 acres which was assembled by E. F. Neely and carried an obligation to drill a 6,000 ft. test. Neely turned the block to W. C. Feazel who in turn sold ½ interest and operations to Shell. The location for the test was made on seismic work done by Shell following the discovery of gas at Muldon field which is located approximately 6 miles southwest of 1 Harrington.

In Chickasaw County, Mississippi, approximately 11¼ miles west of the Aberdeen field discovery well and 11 miles northwest of Muldon field, Carter Oil Co. is preparing to run 7-in. casing in 1 Clem Baskin heirs, Section 19-14s-5e, for completion tests. This Paleozoic wildcat was drilled to total depth of 5,187 ft. in basal Mississippian, then plugged back to 4,437 ft. Open hole drill-stem test was then run at 4,302-4,437 ft. in the Carter (Chester) sand zone which was picked on log at 4,300-60 ft. Using ⅜-in. bottom and ¼-in. top chokes, tool was open 50 minutes with top pressure reaching 400 psi. The gas flow was burned to pits with 20-ft. orange flame. Initial bottom-hole flowing pressure was 450 psi. and had gradually increased to 750 psi. at end of test. Bottom-hole shut in pressure was 1,975 psi. in 30 minutes.

Also in the Black Warrior basin, but in east central Lamar County, Alabama, the Otis D. Coston, 1 H. S. Hankins, Section 32-14s-14w, has been drilled to total depth of 3,320 ft. in basal Mississippian. A drill-stem test was run at 3,219-69 ft. using ⅜-in. bottom and ¼-in. top chokes. Recovery from 3½-hour test was 45 ft. of drilling mud cut with gas and oil. Another test was run on same interval, but tool was open only 1 hour with recovery being 30-ft. of mud. Operators are preparing to run casing for further testing. It is reported that the sand that was being tested was very tight, but was saturated with oil.

MISSISSIPPI SUCCESSFUL WILDCATS

Jefferson County: E. B. Germany & Sons 1 Bowser Ware, Sec. 19-8n-2w, TD 6,009 ft., IP flowed 102 bbl. of oil in 24 hours, ¼-in. choke, 39°-gravity oil.

Monroe County: Shell Oil Co. 1 Mrs. Lee Harrington, Sec. 24-14s-6e, TD 6,120 ft., IP 4,500,000 cu. ft. of gas in 24 hours, open flow.

MISSISSIPPI WILDCAT FAILURES

Adams County: John S. Callon 1 Maud E. Stanton Est., Sec. 69-7n-2w, TD 6,504 ft., dry.

Franklin County: I. P. La Rue, Jr., 1 U.S.A., Sec. 4-5n-2e, TD 7,010 ft., dry.

J. Paul Ratliff, Jr. 1 Davis-Buckles Unit "A," Sec. -5n-1e, TD ,808 ft., dry.

Jefferson County: B. Serio 1 James Humes, et al, Sec. 1-8n-1e, TD 6,503 ft., dry.

Pike County: Sun Oil Co. 1 H. A. Price, Sec. 21-4n-8e, TD 7,347 ft., dry.

ALABAMA WILDCAT FAILURE

Escambia County: Sunnyland Contracting Co. 1 H. L. Lambeth, Sec. 7-1n-8e, TD 6,600 ft., dry.

Texas Gulf Coast

New Pelican Area in Liberty Has Confirmation

HOUSTON.—Floyd L. Karsten shows an open flow of 7,500,000 cu. ft. of gas daily for its 1 B. E. Quinn "D," confirmation well to Liberty County's new Pelican area. The 8,851 ft. well was perforated from 8,841-44½-ft. and previously flowed 1,407,000 cu. ft. of gas and 38 bbl. of 55°-gravity condensate while on a 10/64-in. choke. Well posted a shut-in pressure of 3,181 psi. with a resulting gas-liquid ratio of 41,000-1. Well is located on the Daniel Donoho Survey, A-24, 3 miles northeast of the town of Cleveland.

H. R. Smith, Alice independent operator who drilled a deep but barren test on the east flank of Sour Lake field in Hardin County, will give the area another try. New well will be the 2-A The Keith Co. located 1,750 ft. northeast of the dry hole 1-A well, drilled to the depth of 12,500 ft. Location is on the HT&B Survey, Section 71, A-283, 2 miles northeast of the town of Sour Lake. Deepest pay in the area was on the north flank where 33°-gravity oil is produced from 10,050-60 ft. in the Yegua sand.

Jack W. Frazier, Houston operator, has staked a location for a wildcat test in Harris County west of Houston near the Fort Bend County line. Location is 4½-miles northwest of Clodine field and 5¼-miles west of Alief field in the John Cunningham League, A-193. Well is to be drilled to 8,300 ft.

American Republics Corporation and Houston Oil Co. of Texas have moved south of Ada Oil Co. and Hurt Oil Co., Ltd.'s recent Jasper County Yegua oil strike to drill the 1 John D. Johnson Fee as a confirmation try. Seeking production down to 9,150 ft., the location falls on the John D. Johnson Survey, A-21, 4¾-miles northwest of the town of Buna. Ada and Hurt completed the 1 Hardy Richardson from 7,198-212 ft. for a flow of 183 bbl. of 37.8°-gravity oil daily on ⅛-in. choke.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCAT

DeWitt County: R. D. Mebane & Morris Cannan 1 Dianne Poetter, Dolores Alderete Sur., A-52, TD 7,620 ft., PT 126.27 bbl. of oil per day, ⅛-in. choke, gas-oil ratio 905-1, 36.8°-gravity oil, perf. 7,334-39 ft.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Brazoria County: Greenbrier Oil Co. 1 W. J. Bryan, J. Brougham Sur., A-164, TD 7,520 ft., dry.

DeWitt County: Kirkwood & Co. et al 1 Edwin Steinman, Jas. A. Moody Sur., A-333, TD 8,016 ft., dry.

Fayette County: Hamman Oil & Refining Co. et al 1 Sam Bilton, Jr., Wm. Kuykendall ½ Lge., A-219, TD 2,535 ft.,

Galveston County: Pan Am Production Co. 1 Houston Negro Hospital, A. Edwards Lge., A-10, TD 12,064 ft., dry.

Karnes County: Hankamer Investment Co. 1 Albert Bargmann, Casper Flores Sur., A-1, TD 7,020 ft., dry.

Washington County: Gulf Coast Leaseholds, Inc. 1 G. W. Tate et ux, W. S. Brown Sur., TD 9,800 ft., dry.

Appalachian-Ohio

Clinton County Test Completed Dry in Oriskany

COUDERSPORT, Pa.—Delta Drilling Co.'s 1 Ray Hirlinger in Leidy Township, Clinton County found salt water in the Oriskany sand. This well was drilled southeast of the main Leidy pool in a complicated fault area. Indicated porosity may lead to further testing of the area. Oriskany top was 6,797 ft. and salt water was found at 6,801 ft., elev. 1,696.

In Greene Township, Clinton County 1 Walizer of Deep Rock Oil Corp. is drilling at 1,336 ft.

The California Co.'s 1 Byron Schnyder in Pine Township, Lycoming County is attempting to drill by string of tools. Total depth is 6,475 ft.

A recently announced wildcat location is Keta's 1 Brion-Goodall. This test, located in Cogan Township, Lycoming County, will be third test to be drilled on Cogan House dome. Only well completed on structure was located 2 miles southwest of Keta's location and had a show of gas in Oriskany at a depth of 7,498 ft.

In Union district, Preston County, West Virginia, Hope Natural Gas Co. 9752 Clara L. Barry, elevation 2,021 ft. reached the Oriskany sand at 4,866 ft., and recorded 2,214,000 cu. ft. of gas at 4,867-74 ft., with drilling at 4,881 ft. Portland district, Cumberland & Allegheny Gas Co. No. 477 drilled through the Oriskany sand 5,516-44 ft. The gas at 5,519 ft. did not increase. The present depth of the hole is 5,660 ft. No. 483 W. H. Harriman, will be acidized. Williamsburg district, Greenbrier County, Deep Rock Oil Corp. 1 Bertha H. Thornbury et al, shot the gas pay in the Williamsport sand and is now cleaning out. The depth remains unchanged at 7,388 ft.

Unity Township, Westmoreland County, Southwest Pennsylvania, Peoples Natural Gas Co. 4003 A. J. Dotterway, is drilling at 8,780 ft., No. 4008 J. R. Frola, at 7,550 ft., and 4019 A. W. Kintz, is spudding in. Greenville Township, Somerset County, New York State Natural Gas Corp. 320 M. V. Newman, after being shut down, is now drilling at 1,915 ft.

PENNSYLVANIA WILDCAT FAILURE

Clinton County: Delta Drilling Co. 1 Ray Hirlinger, dry, in Oriskany, TD 6,801 ft. elev. 1,696.

OHIO

A fourth producer was completed in the east part of New Castle Township, Coshocton County, National Gas Co. 2 Earl Hughes, Lot 23. Clinton sand at 3,213-69 ft. was Hydrofraced and made 140 bbl. in the first 48 hours.

Wray Drilling Co. stepped over a dry hole to extend the field in northwestern Perry Township, Coshocton County. The completion on 6 Ray Hays, Section 4, with Clinton at 3,161-3,216 ft. was shot and made 50 bbl. in 24 hours.

Mid West 4 Gladys Griffith, Section 24, Jackson Township, Knox County, found the sand at 2,940-3,001 ft. with a good showing of oil that increased to 265 bbl. in 24 hours after shot.

R. H. Helmick et al 2 Stanton, Lot 8, Prairie Township, Holmes County, logged a

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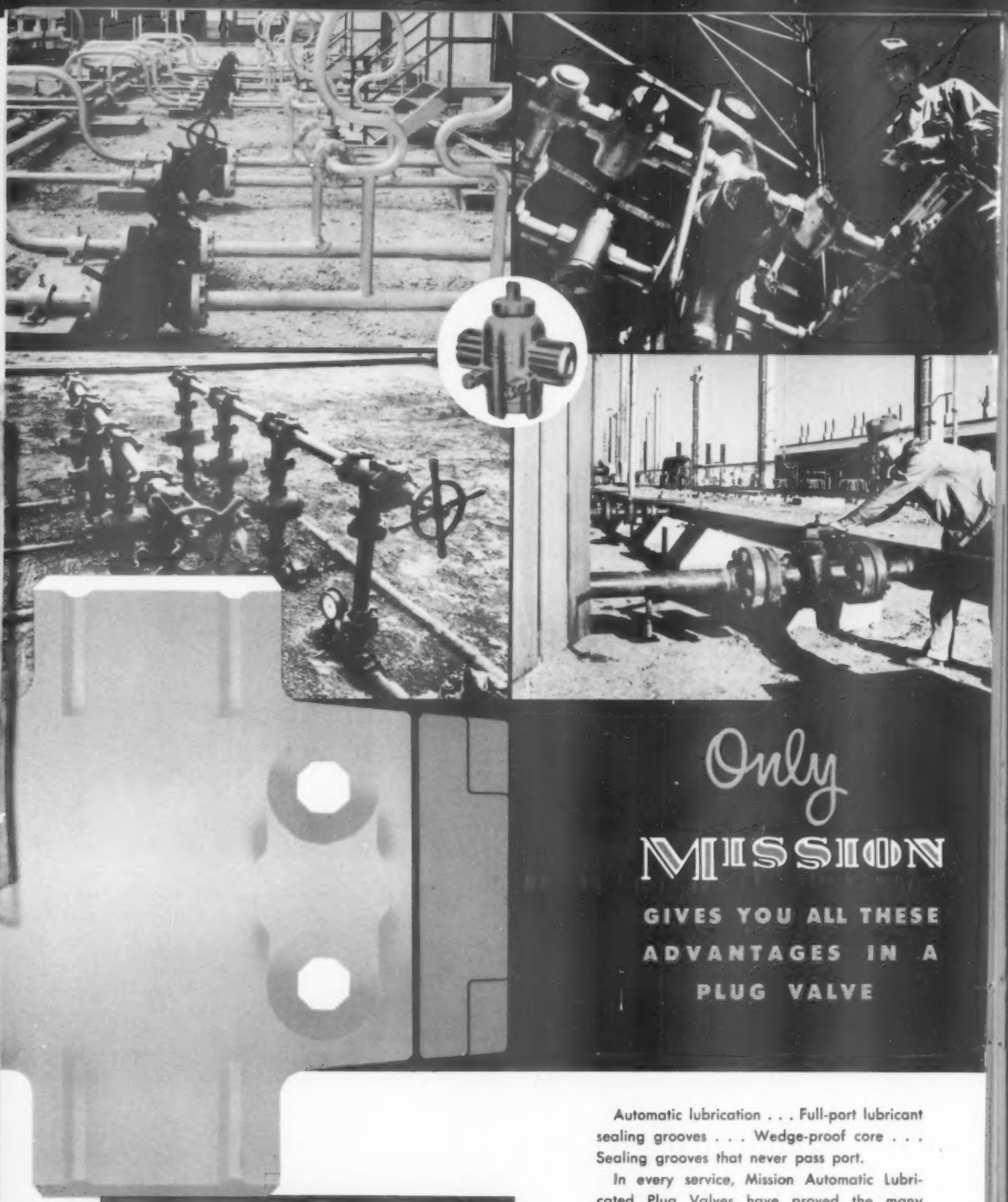

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show of oil at 3,528-44 ft. which made 40 bbl. the first day after a 140-qt. shot.

OHIO WILDCAT FAILURE

Lawrence County, Fayette Township: Ohio Fuel Gas Co. 1 W. W. Marcum, Sec. 22, shale 1,900-2,366 ft., TD 2,432 ft.

Central Area

ILLINOIS

In White County C. E. Brahm 2 L. H. Bayley, SW SE NE 16-7s-9e, a ¾-mile step-out to Herald pool, is pump testing 6 bbl. of oil per hour from the Cypress at 2,606-26 ft. with total depth at 2,905 ft. Also in White County E. J. Cunningham's 1 Lewis Downen, NW SE SE 5-7s-9e, is pumping 68 bbl. of oil per day from the Benoist at 2,893-2,902 ft. with total depth at 3,197 ft.

INDIANA

Hartman & Jordan's 1 J. C. Ellis and A. Aldrich Community, SE NW SE 33-5s-14w, Posey County, is pumping 40 bbl. of oil per day from the Rosiclare lime at 3,068-76 ft. with total depth at 3,205 ft. George & Wrather Oil Co.'s 1 Raymond and Naedine Morgan, NW NE NW 9-3s-9w, Gibson County, got 1 ft. of oil and 14 ft. of oil-cut mud on a drill-stem test of the Aux Vases at 1,825-38 ft.

WESTERN KENTUCKY

In Webster County, 5 miles west of Sebree and 2 miles southeast of Poole, Al Cherry and Associates are putting 1 Melton, 18-N-23, on the pump to test the Tar Springs sand from 1,860-70 ft. with total depth at 1,870 ft. The hole filled with oil in 12 hours.

In Hopkins County James F. Secrest has a possible new pool opener at 1 W. E. Gailor, NE NE 20-L-25 with pay in the Aux Vases sandy lime from 2,800-08 ft. The well should make 75 to 100 bbl. per day when completed. The wildcat is 9 miles from nearest production.

EASTERN KENTUCKY

In Estill County and in the deep (St. Peter gas field) at Furnace Post Office, Raydure et al are drilling a new test which will be the first drilling in this field in several years. New effort is 1 Homer Shouse. Further south of this well which is drilling at 900 ft., Carpenter et al have a location for 4 Garrett another Ordovician sand test.

MICHIGAN

An encouraging and interesting oil and gas showing in the Traverse was being tested at the Allied Investment, Inc. 1 Hubbard, SW SW SW 36-3s3w, Concord Township wildcat Jackson County. Top of Traverse lime was logged at 1,627 ft. Porosity was logged from the top of the Traverse to the total depth, 1,628 ft. On initial bailer tests after fluid showed, well carried 21 bailers of fluid, estimated to be from a quarter to a third oil, in 5 hours. A gas head, estimated at 40,000 cu. ft. a day, was also showing. After being shut in for 44 hours, fluid level was reported at 500 ft. of which about 50 per cent was water, and at least a part of the water showing was believed to be bottom-hole water encroachment. Well was scheduled to be cased with 5-in. and tubed in preparation for pumping in an endeavor to evaluate this showing. Crude oil was reported to be a heavy, paraffin base oil, but no analysis of the crude had been made to this time.

This new Jackson County wildcat showing oil from the Traverse is located about 6 or 7 miles northwest of the E. Edwin Brehm 1 Reed, SW NW SW 18-4s-1w, Liberty Township, Jackson County, which flowed oil, gas and water from a Top Traverse porosity zone, but which shortly was drowned out by bottom hole water. The Brehm wildcat has since been in the process of being deepened to lower horizons. The Allied wildcat is generally believed by geologists to be on an entirely different feature than the Brehm wildcat.

Allied Investments, Inc., newcomers to Michigan, but successful producers in the Tri-State area, has been conducting an extensive wildcatting program in Jackson and Hillsdale counties. This well is the first of the Allied tests to show oil or gas in commercial or near-commercial quantities. Additional drilling is expected to follow in this general area regardless of the outcome of the 1 Hubbard.

ILLINOIS WILDCAT FAILURES

Champaign County: A. A. Huff 1 Dollenback, NW NE NW 36-17n-7e, dry, TD 915 ft.

Clinton County: R. Robbens 1 Kruse, NW SW NE 13-1n-4w, dry, TD 1,010 ft.

Clay County: Don Traders 1 Brook, SE SE NW 29-5n-7e, dry, TD 2,985 ft.

Hancock County: J. B. Bushnell 1 Gray, SE SE SW 22-5n-5w, dry, TD 525 ft.

Jasper County: Gulf Refining Co. et al 1 Geier, SE SW SE 19-5n-9e, dry, TD 3,186 ft.

Madison County: C. P. Douglas 1 Ernest, NE NW NE 17-6n-5w, dry, TD 2,006 ft.

Wayne County: National Assn. 1 Smith, NW NW NW 9-2s-6e, dry, TD 3,375 ft.

INDIANA SUCCESSFUL WILDCAT

Perry County: B. Nation 1 Shelton, NW SW SE 23-4s-3w, IPP 3 bbl. of oil per day from Jackson 305-310 ft., TD 320 ft. (opens Bristow West pool).

(Continued on page 153)

Rocky Mountain

Nebraska Wildcats Proved Apparently Commercial

DENVER.—Three of four wildcats in Kimball County, Nebraska, which indicated commercial possibilities a week ago have proved apparently commercial on later tests. The fourth was a failure.

H. J. Williams perforated the "J" sand from 6,209-19 ft. in 1 Alley, SW SW NW 1-12n-55w, and swabbed 62 bbl. of fluid in 12 hours, cutting 6 to 21 per cent b.s. and w. Tests are continuing. Forest Oil Co. is installing pump at the 1 Marcum, NW NW NW 27-13n-55w, first of the trio to show for production. The wildcat swabbed at the rate of 2½ bbl. of fluid per hour for 7 hours, with the recovery cutting 5 per cent b.s. and w.

Anderson-Prichard Oil Co., Rogers Oil Co., and Bert Wheeler are continuing tests at 1 State, NW NW NW 36-15n-56w, after swabbing 158 bbl. of oil and 30 of water in 24 hours. This well was cased without benefit of drill-stem tests, since all attempts to test failed. Independent Harry Royster of Denver plugged 1 Evertson, NE SW NE 12-16n-57w, in this general area when tests of saturation cored in both "D" and "J" sands failed. Further testing of the area is a possibility, according to this operator.

In Colorado Twin Oil Co. has made initial tests of its important apparent discovery in southeasern Weld Couny. The well, 2 Cuykendall, NW NW SW 12-2n-63w, flowed oil at the rate of 3 bbl. per hour from perforations 7,018-32 ft. in "J" sand. Flow was shut off after 1 hour pending erection of tanks. The wildcat is important as the most centrally located discovery made to date in the Denver-Julesburg basin, with production at depths greater than usual in the producing "trend" in the more northeasterly portion of Colorado.

Nearest previous production to the Twin Oil discovery is 30 miles to the north in the old Greasewood field. The successful wildcat is the fourth drilled through this general area near the town of Roggen, Colorado.

Twin had two previous failures in the area, one of them just ½ mile east of the current discovery which was temporarily abandoned after fairly good shows. McDannald Oil Co. also drilled a failure in the area which had some shows in "J" sand.

New Denver-Julesburg basin wildcats during the week were concentrated in Colorado, with new starts at a standstill in the Nebraska portion of the basin. There were three wildcats located in Logan County, three in Weld, and one in Adams County.

In Wyoming Ohio Oil Co. is coring ahead below 10,320 ft. at the 1 Unit, NW NE SW 22-22n-85w, in the Cedar Ridge area of Carbon County, an apparent Frontier sand discovery. The operator tested the zone 10,119-137 ft. for a flow of gas at an estimated rate of 4-5 million cu. ft. per day with a flow of oil at a rate not estimated. Recovery in pipe was 230 ft. of clean oil, 1,440 ft. of 50 per cent oil-cut mud, and 3,600 ft. of mud. The wildcat is a scheduled 9,500-ft. test of Sundance, but has not penetrated that formation since the area is faulted and the well redrilled some 3,000 ft. of Mesaverde sandstone. While no further shows have been reported to the present total depth, the operator has indicated that the wildcat may be carried deep enough to test the original objective.

J. D. Sprecher and Big Horn-Powder River Corp. have staked a confirmation well offsetting their recent discovery in the Wildcat Creek area of Weston County, south of the Clareton producing area. The discovery well 1 Wakeman, is now producing 700-800 bbl. per day through ¾-in. choke from Newcastle sand. The discovery is rated the most important development in this area for the past several years.

Further testing of the Zack Brooks-Crawford Smith discovery, 1 Berentson, C SW SE 21-163n-80w, in the Turtle Mountain area of Bottineau County, North Dakota indicated a production of 75 bbl. per day in the eastern Williston basin discovery. Test was on pump from perforations in the zone 3,353-65 ft. after sand fracturing and acidization. Previous tests of this well had recovered a considerable amount of water with the oil, and production on prior tests was as low as 8½ bbl. per day. The operator squeezed off lower perforations which are open during previous testing. Two other wildcats in the vicinity, are now shut down, and Ray Holbert Drilling Co. is testing at a third, 1 Ekrahagen estate, C NE SE 9-163n-78w, with no recoveries announced as yet.

Amerada Petroleum Corp. has run casing and is testing at the 1 Rice, C NE NW 23-158n-94w, important extension 3 miles east of Tioga field in Mountrail County. The well made 7 bbl. of oil and 14 of water swabbing from the Madison zone 8,371-86 ft. during 11-hour period.

WYOMING WILDCAT FAILURE

Hot Springs County: Western Empire Oil Co. 1-X Saversey, NE SW NW 15-44n-98w, dry, TD 4,156 ft.

COLORADO WILDCAT FAILURES

Adams County: Warren Petroleum Corp. 1 E. L. Crisman, SW NW SE 6-2s-63w, dry, TD 7,977 ft.

Logan County: Falcon-Seaboard 1 Handelman, SE SE NW 24-8n-55w, dry, TD 5,359 ft.

Herndon Drilling Co. 1 Kuhns, NE SE NW 27-11n-51w, dry, TD 4,730 ft.

Washington County: Quintana Production Co. 1 State, C SE NW 16-2s-49w, dry, TD 4,166 ft.
Hanco Oil & Gas Co. 1 Anholtz, SE SE NW 30-5s-53w, dry, TD 5,000 ft.
Weld County: Ziegler Exploration Co. 1 Tway, SE NW SE 6-7n-58w, dry, TD 6,504 ft.
J. Ray McDermott & Co. 1 Sprague Ranch, NW NW SE 2-10n-57w, dry, TD 6,309 ft.

NEBRASKA WILDCAT FAILURES

Kimball County: Lion Wondra 1 Swenson, SE SE SE 23-13n-54w, dry, TD 6,053 ft.
Harry Royster 1 Evertson, NE SE NE 12-16n-57w, dry, TD 6,800 ft.

UTAH WILDCAT FAILURE

Duchesne County: Stanolind Oil & Gas Co. 1 Rich, C SE NW 23-8s-16e, dry, TD 7,500 ft.

MONTANA WILDCAT FAILURE

Dawson County: Ajax Oil Co. and Washington Co-Op. 1 Osborne, C NW NW 2-15n-54e, dry, TD 9,354 ft.

NORTH DAKOTA WILDCAT FAILURES

Bottineau County: Ray Murray-M. B. Monson 1 Stavheim, SE SE 33-164n-79w, dry, TD 3,486 ft.
Grant County: Youngblood & Youngblood 1 Lester Kelstrom, SW SW 26-133n-83w, dry, TD 6,798 ft.
Kidder County: Carter Oil Co. 1 State, S NE SW 16-143n-71w, dry, TD 5,144 ft.
Ramsey County: Northern Natural Gas 1 Raymond P. Lee, C NE NE 26-134n-63w, dry, TD 3,267 ft.

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Kansas

Operator Prepares to Test At Stafford County Wildcat

NATIONAL CO-OPERATIVE REFINERY ASSOCIATION prepared to test an oil show at their 1 McCune "B," NW SW SW 4-25s-12w, wildcat 4 miles northeast of Leesburgh field in Stafford County. Lansing lime was topped at 3,562 ft. with a gas show at 3,565-9½ ft. The Arbuckle was found with good shows at 4,146 ft. Recovery on a 2-hour drill-stem test at 4,148-57 ft. was 120 ft. of heavily oil and gas-cut mud, 60 ft. of gassy oil, 660 ft. of oil and gas-cut water, and 900 ft. of water with a good gas show.

Sterling Drilling Co. has a possible discovery in the currently active southern part of Saline County at 1 Miller, NE SE SW 32-15s-3w. The wildcat is 1 mile north of Salemsborg pool and 2 miles east of Smolan pool. A drill-stem test in Maquoketa dolomite from 3,392-96 ft. recovered 90 ft. of heavily oil and gas-cut mud and 120 ft. slightly mud-cut gassy oil.

Jones, Shelburne & Farmer are installing pump at their pool opener, 1 Frazier, NW NW SW 33-9s-21w, ¾ mile northeast of Smith-Denning pool. The well was swabbed for 30 bbl. per hour.

Schermerhorn Oil Co. has completed 1 Hamilton, SW SW SE 9-21s-10w, outpost 4 miles south of Raymond pool in Rice County, for a pump potential of 408 bbl. of oil per day, opening Galt pool and establishing first production in the township. The well produces from Arbuckle.

Transit Corp. and Davis Bros. have opened a new pool 1 mile south of Dreiling pool in Ellis County at 1 Berens, SE SE SW 27-14s-16w. The discovery was completed for 300 bbl. of oil per day from the Lansing.

KANSAS SUCCESSFUL WILDCATS

Ellsworth County: Wentworth-Shields 2 Sturn, NE NW NE 36-17s-10w, pumped 373 bbl. of oil from Sooy 3,226-31 ft., TD 3,258 ft. (new pay at Heiken pool).
Morton County: Colorado Interstate-Hartman 1 Stoops, NW SW NW 5-32s-42w, flowed 12,500 M.c.f. of gas 3,534-44 ft., TD 5,268 ft.
Stafford County: Sunray Oil Corp. 1 Hahn, SW SW NE 21-22s-13w, pumped 16 bbl. of oil from Lansing-Kansas City 3,610-15 ft., TD 3,839 ft. (opens Hahn pool).

KANSAS WILDCAT FAILURES

Barber County: Musgrove 1 Fitzsimmons, SE SE NW 10-32s-12w, dry, TD 4,551 ft.
Barton County: Great Bend Brick & Tile Co. 1 Tammen, NW NE NW 33-19s-15w, dry, TD 3,692 ft.
Butler County: R. Gear 1 Prewitt, SW SW NE 2-24s-7e, dry, TD 2,783 ft.
Rex & Morris 1 Getter, SW SW NW 7-28s-6e, dry, TD 2,804 ft.
Cowley County: Brokbeck & Smitherman 1 Andes, NW NW SW 29-32s-3e, dry, TD 3,200 ft.
McNeish & Gralapp 1 Morris, SE SE NE 33-32s-3e, dry, TD 3,210 ft.
Ellis County: Musgrove 1 Planters State Bank, SW SW NE 31-11s-16w, dry, TD 3,506 ft.
Trans-Era 1 Merrill, SW SW NE 4-12s-19w, dry, TD 3,665 ft.
Graham County: S. Smith et al 1 Faulkner, SW SW NW 23-10s-22w, dry, TD 3,989 ft.
Greenwood County: W. McGinnis 1 Redding, SE SE SE 3-23s-11e, dry, TD 1,970 ft.
Harper County: Sohio Petroleum Co. 1

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but men able to use their opportunity."

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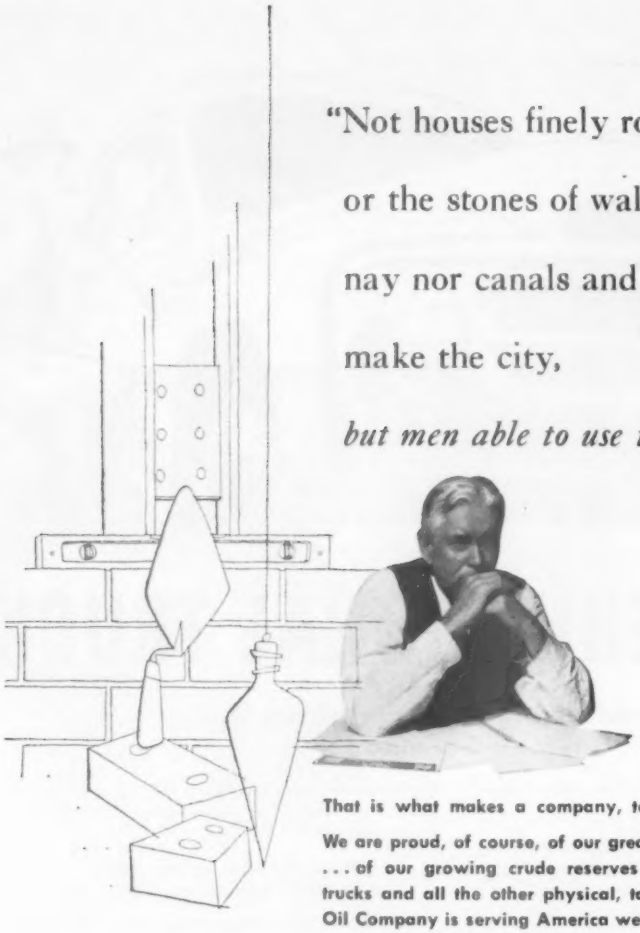

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	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49
Production	469	299	184	158	83	9	3	..
Refining	74	237	220	153	31	2	..	..
Transportation	88	75	60	33	17	5	4	..
Marketing	132	141	108	83	21	8	9	1
General Office	114	96	115	76	53	10	3	2
Total	877	848	687	503	205	34	19	3

BE SURE WITH PURE — PURE

THE PURE OIL COMPANY

Weede, SE NE NW 3-23s-5w, dry, TD 4,825 ft.

Harvey County: W. Kuhn-H. Redman 1 Sanders, SW SE SW 29-24s-2e, dry, TD 3,302 ft.

Hodgeman County: Imperial 1 Springer, SW SW SW 23-22s-24w, dry, TD 4,675 ft.

Kiowa County: M. B. Armer 1 Koehn, SW SW SW 29-30s-19w, dry, TD 5,200 ft.

Lyon County: Stewart 1 Mackey, NW NE NW 21-21s-10e, dry, TD 2,271 ft.

Pratt County: Rine Drilling Co. 1 Leonard, SE SE SE 13-26s-15w, dry, TD 4,652 ft.

Rice County: Braden 1 Profitt, NW NW NW 29-21s-10w, dry, TD 3,492 ft.

Rooks County: K&E 1 Thomas, SE SE NW 36-9s-19w, dry, TD 3,832 ft.

Trans-Era 1 Veatch, NE NE SE 33-10s-20w, dry, TD 3,750 ft.

Seward County: Columbian Fuel 1 Alexander, C SE NW 34-33s-32w, dry, TD 6,000 ft.

Thomas County: Herndon 1 Ostmeyer, NE NE SE 1-10s-31w, dry, TD 4,710 ft.

California

Extension Tests Under Way In Kern County Areas

LOS ANGELES.—Two extension tests were under way in the 3-mile stretch between Antelope pool on the Honolulu anticline and a successful producer on the United anticline at Buena Vista Hills, Kern County. If both are successful the intervening distance will be reduced to about 1¾ miles.

In SE 26-31-23e, Murvale Oil Co. 555 Murvale-Tide Water was nearing 2,500 ft. It is slightly over 1 mile southeast of the discovery well on the United anticline, which was completed in the fractured shale zone at 4,150-4,868 ft.

On the northwest end of the 3½-mile long pool being developed on the Honolulu structure, Standard Oil Co. of California 552 1-C had pipe set at 4,248 ft. and was in process of completion. Standard successfully completed 522 15-D in NW 15-32s-24e to extend production ½ mile southeast.

A new wildcat getting under way in the McKittrick area was Ferguson & Bosworth 1 U. S. Land in 8-30s-21e, about 2 miles west of production. It is scheduled to test the Oceanic and Point of Rocks zones found at about 6,000 ft.

Activity continued to pick up in the vicinity of General Petroleum Corp.'s recent discovery in the Edison area, 10 miles southeast of Bakersfield. Donald Frankel was preparing to spud 1 H. C. Levi in NE SW 4-30s-29e, about ¼ mile north of the discovery. In SW SW Section 9, General Petroleum 27-9 Graham was seeking to extend production ½ mile southwest. Seven rigs were at work in the area.

CALIFORNIA SUCCESSFUL WILDCAT

San Luis Obispo County, new Knoxville sand pool in Guadalupe field: Thornbury Drilling Co. G-4 LeRoy, 1-10n-36w, recompleted in Sisquoc and Knoxville at 2,685-3,287 ft. for 300 bbl. daily of 10.5°-gravity crude, base of Sisquoc and top of Knoxville, 2,761 ft., TD 3,287 ft., elev. 97 ft.

CALIFORNIA WILDCAT FAILURES

Kern County, Arvin area: Morton & Dolley 1 Digiorgio, 11-31s-29e, dry, TD 4,245 ft., elev. 520 ft.

Comanche Point area: C. E. Zillgitt 51-1 Tejon Creek, 3-11n-18w, dry, TD 1,070 ft., elev. 1,005 ft.

Pattiway area: Santa Fe Drilling Co. 1 Pancho, 24-10n-24w, dry, TD 4,844 ft., elev. 4,005 ft.

Rosedale area: Humble Oil & Refining Co. 11 KCL C (16-14), 14-28s-26e, dry, TD 10,530 ft., elev. 371 ft.

Salt Creek area: Ferguson & Bosworth 4 Richardson, 18-29s-21e, dry, Brown shale 1,400 ft., TD 1,470 ft., elev. unreported.

Temblor Hills area: Southern California Petroleum Corp. 1 St. Anthony-Jasper-Hagood, 18-30s-21e, dry, TD 4,518 ft., elev. 3,009 ft.

Tunis Creek area: D. K. Partnership 1, 21-28 Corral, 28-11n-18w, dry, TD 2,068 ft., elev. 870 ft.

Los Angeles County, Canoga Park area: W. J. Dennis 3 Knapp, 4-1n-17w, dry, TD 1,450 ft., elev. 1,230 ft.

Del Valle area: Rothschild Oil Co. 1 Barbour, 16-4n-17w, dry, TD 5,753 ft., elev. 1,191 ft.

Newhall area: J. L. Watkins 1 Legion, 1-3n-16w, dry, TD 3,231 ft., elev. 1,338 ft.

San Luis Obispo County, Cuyama Valley area: C. W. Colgrove 22-4A Russell, 4A-10n:26w, dry, TD 8,536 ft., elev. 2,130 ft.

North Basin Exploration Corp. 1, 9-11n-28w, dry, TD 2,402 ft., elev. 2,756 ft.

Santa Barbara County, Cuyama Valley area: The Texas Co. 1 Signal-Maxwell, 19-9n-25w, dry, TD 6,565 ft., elev. 3,206 ft.

Bradley Canyon area: General Petroleum Corp. 86-5 Bradley Lands, 5-9n-33w, dry, TD 8,068 ft., elev. 636 ft.

Sutter County, Marysville area: Richfield Oil Corp. A-2 Sutter Community, 8-15n-2e, dry, TD 2,290 ft., elev. 86 ft.

Ventura County, Timber Canyon area: Richfield Oil Corp. 1 Atlas-Smith 14-4n-21w, dry, TD 8,460 ft., elev. 3,431 ft.

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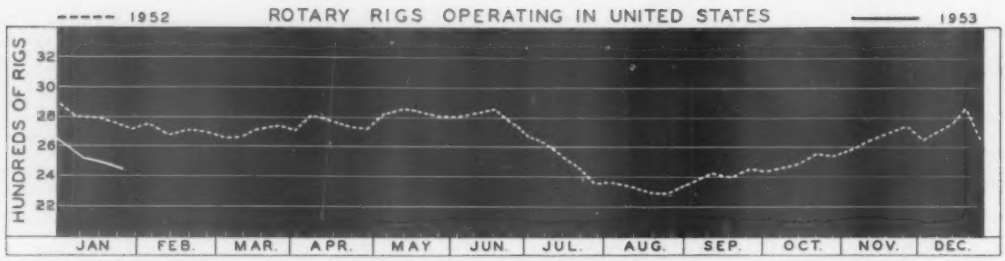
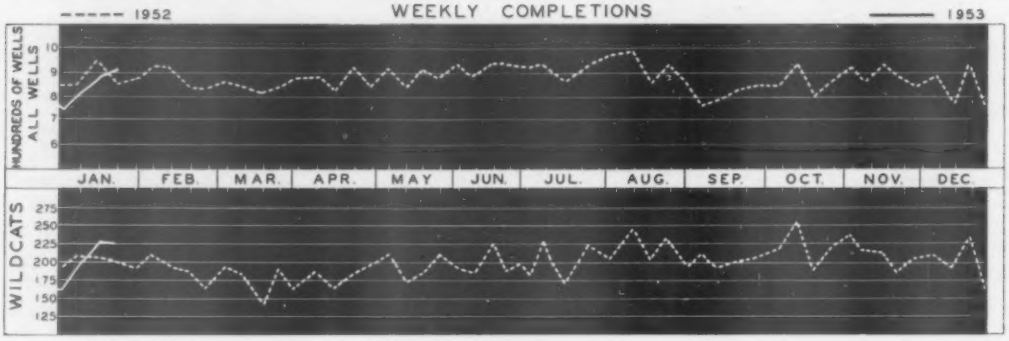




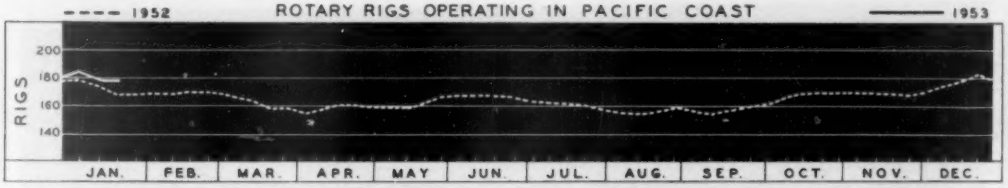
CURRENT STATISTICS

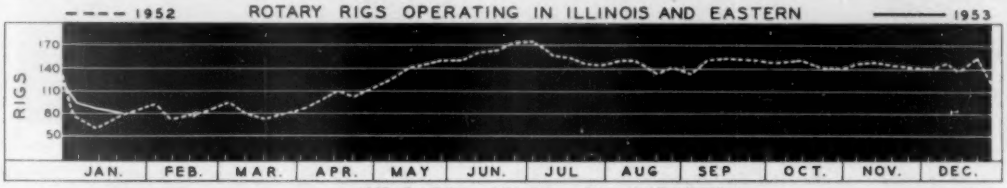
EXPLORATION

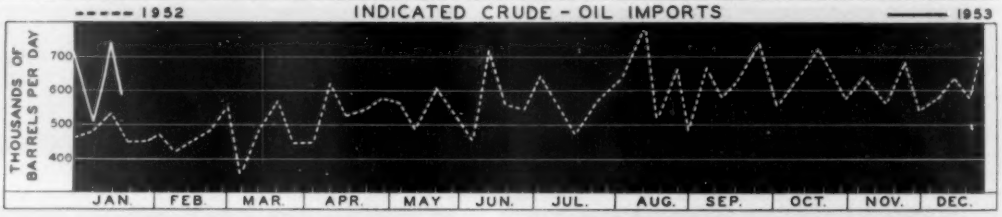
WEEKLY WELL COMPLETIONS . . .WEEK ENDED JANUARY 24, 1953

	Total of all wells					Jan. 24		Wildcat completions and discoveries					Cumulative total, 1953				
	Comp.	Oil	Gas	Dry	Footage	1953	1952	Oil	Dst.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	13	7	0	*6	21,810	45	23	0	0	0	0	0	0	0	0	0	0
Pennsylvania	32	15	3	†14	53,920	112	103	0	0	0	1	1	0	0	2	4	6
West Virginia	14	3	5	6	35,828	30	53	0	0	0	0	0	0	0	0	0	0
Ohio	20	11	1	‡8	44,762	56	54	0	0	0	1	1	0	0	0	1	1
Indiana	55	15	6	34	92,640	126	61	1	0	0	14	15	3	0	1	25	29
Kentucky	20	4	8	8	48,983	89	87	0	0	1	1	2	4	0	1	15	20
Illinois	41	17	0	24	94,088	158	96	0	0	0	7	7	1	0	0	28	29
Michigan	11	5	1	5	31,268	45	37	0	0	0	4	4	3	0	0	15	18
Kansas	101	35	11	§55	341,767	277	372	2	0	1	21	24	7	0	2	62	71
Nebraska	5	1	1	3	27,153	17	23	0	0	0	2	2	0	0	0	7	7
Oklahoma	112	63	4	§45	397,664	394	471	4	0	0	16	20	6	1	1	42	50
Texas	301	173	8	120	1,463,305	934	1,158	20	2	1	67	90	56	6	10	242	314
North Central (Dist. 7-B & 9)	107	58	1	48	369,524	304	359	14	0	0	27	41	31	0	1	91	123
West (Dist. 7-C & 8)	66	48	0	18	378,320	201	338	1	1	0	10	12	5	1	0	39	45
Panhandle (Dist. 10)	13	7	3	3	52,340	36	45	0	0	0	3	3	0	0	0	5	5
Eastern (Dist. 5 & 6)	17	6	0	11	87,914	40	59	1	0	0	9	10	1	0	0	18	19
Gulf Coast (Dist. 2 & 3)	43	19	3	21	310,510	164	194	2	0	1	6	9	10	0	4	44	58
Southwest (Dist. 1 & 4)	55	35	1	19	264,697	189	163	2	1	0	12	15	9	5	5	45	64
Louisiana	33	20	0	13	230,220	186	168	0	0	0	5	5	4	1	1	25	31
Northern	15	11	0	4	71,169	95	96	0	0	0	1	1	1	0	0	13	14
Southern	18	9	0	9	159,051	91	72	0	0	0	4	4	3	1	1	12	17
Arkansas	14	6	0	8	44,849	35	25	0	0	0	3	3	1	0	0	9	10
Mississippi	12	5	0	7	82,904	33	27	2	0	0	4	6	4	0	0	13	17
Southeastern States	2	1	0	1	12,678	8	1	0	0	0	1	1	1	0	0	7	8
Montana	11	5	3	3	40,429	32	14	0	0	0	1	1	0	0	0	4	4
Wyoming	12	7	0	5	66,487	40	44	0	0	0	1	1	0	0	0	10	10
Colorado	9	1	0	8	49,987	38	31	0	0	0	7	7	0	0	0	26	26
Utah	1	0	0	1	7,500	7	3	0	0	0	1	1	1	0	0	4	5
New Mexico	31	20	2	9	246,266	94	62	1	0	0	7	8	2	0	1	11	14
California	53	34	0	19	228,090	160	140	0	0	0	17	17	1	0	0	39	40
North Dakota	7	3	0	4	44,267	17	1	0	0	0	4	4	0	0	0	6	6
Miscellaneous (Tenn.)	6	0	1	5	5,446	7	6	0	0	0	5	5	0	0	0	5	5
Total United States	916	451	54	411	3,712,311	2,940	3,060	30	2	3	190	225	94	8	19	600	721
Total previous week	896	437	59	400	3,761,793			31	2	9	188	230	64	6	16	410	496
Total January 26, 1952	884	465	87	332	3,874,793			21	5	3	160	189	96	9	15	617	737

Service wells included: *6, †11, ‡3, §1.



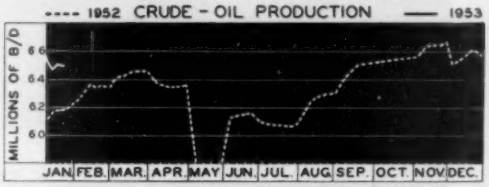


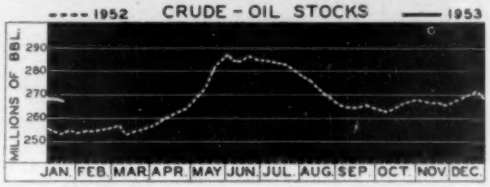


DAILY AVERAGE PRODUCTION FOR WEEK

	January 24, 1953			Jan. 17
	Crude oil	Lease condensate	Total	total
Alabama	3,700		3,700	3,800
Arkansas	75,600	600	76,200	76,600
California	994,200		994,200	993,900
Colorado	89,000		89,000	87,300
Eastern	54,800		54,800	54,800
Florida	1,525		1,525	1,525
Illinois	163,600		163,600	161,900
Indiana	32,800		32,800	34,100
Kansas	321,800		321,800	351,900
Kentucky	29,600		29,600	29,800
Louisiana	655,025	34,550	689,575	690,525
North	111,200	2,550	113,750	114,700
South	543,825	32,000	575,825	575,825
Michigan	34,500		34,500	33,500
Mississippi	91,850	4,550	96,400	95,100
Montana	28,000		28,000	28,200
Nebraska	13,200		13,200	12,100
New Mexico	178,000	450	178,450	178,350
Oklahoma	526,100		526,100	529,600
Texas	2,873,475	48,275	2,921,750	2,921,750
Dist. 1	37,100	250	37,350	37,350
Dist. 2	161,500	5,200	166,700	166,700
Dist. 3	474,250	25,200	499,450	499,450
Dist. 4	257,850	5,900	263,750	263,750
Dist. 5	52,525	350	52,875	52,875
Dist. 6	125,700	5,100	130,800	130,800
East Texas field	262,500		262,500	262,500
Dist. 7-B	111,800	100	111,900	111,900
Dist. 7-C	170,725	5,300	176,025	176,025
Dist. 8	952,275	350	952,625	952,625
Dist. 9	187,500	500	188,000	188,000
Dist. 10	79,750	25	79,775	79,775
Utah	5,200		5,200	5,300
Wyoming	216,000		216,000	215,000
North Dakota	12,000		12,000	11,200
Total U. S.	6,399,975	88,425	6,488,400	6,516,250
Change from previous week, down			27,850	
Canada	181,475		181,475	145,000
Total U. S. production January 1-January 24			155,897,950 bbl.	
Same period last year (crude plus cond.)			*148,983,255 bbl.	

*Includes 2,278,815 bbl. condensate.



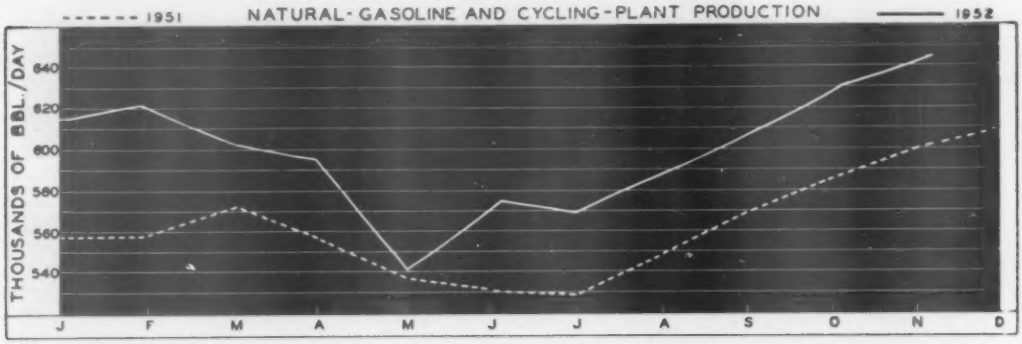


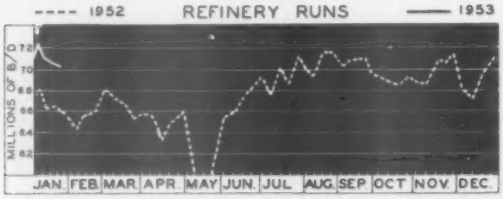
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

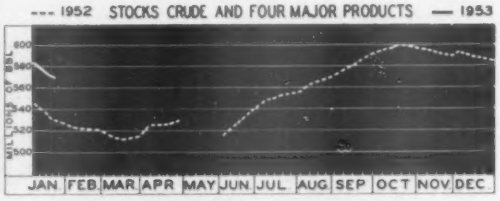
(Thousands of barrels)

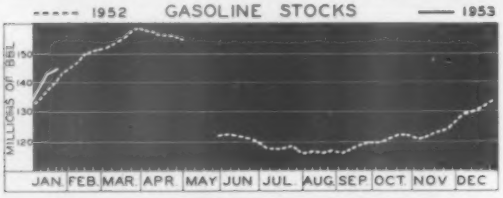
	Jan. 17, '53	Jan. 10, '53	Jan. 19, '52
Pennsylvania Grade	2,282	2,265	2,104
Other Appalachian	2,005	1,823	1,755
Illinois, Indiana, Michigan	10,432	10,818	11,709
Arkansas	3,215	3,332	2,868
Louisiana	15,502	15,440	13,709
North	2,608	2,523	2,599
Gulf	12,894	12,917	11,110
Mississippi	3,291	3,143	3,369
New Mexico	7,069	7,374	7,315
Oklahoma and Kansas	35,496	34,847	39,971
Texas	133,773	134,040	121,083
East Texas proper	11,530	11,023	10,909
West Texas	61,792	61,899	55,306
Texas Gulf	26,249	26,444	24,782
Other Texas	34,202	34,674	30,086
Rocky Mountain	14,290	14,631	14,009
California	32,234	31,731	29,868
Foreign	7,924	8,434	6,564
Total	267,513	267,878	254,324

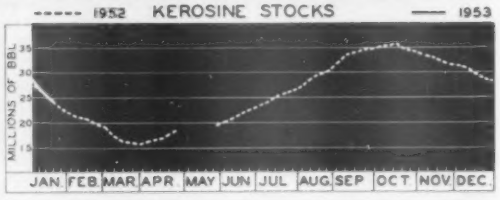
*Bureau of Mines.

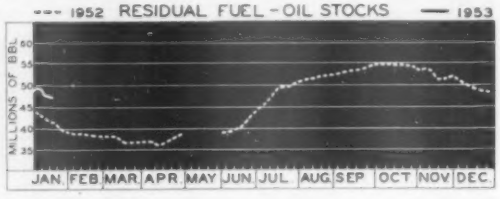










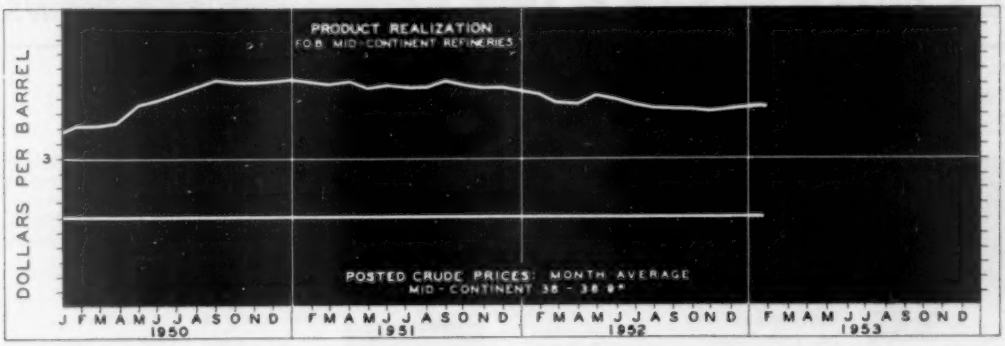


A.P.I. REFINERY REPORT, JANUARY 24

(Thousands of barrels)

District—	Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.	Stocks‡—Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, January 1952—Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.
East Coast	1,088	452.0	44.3	289.1	253.1	33,361	10,420	31,314	13,000	966	387.9	48.6	244.9	248.4
Appalachian:														
District 1	121	49.1	10.1	17.9	18.4	4,043	500	1,580	574	108	48.3	5.3	18.1	15.1
District 2	91	46.1	6.7	14.7	17.2	1,897	309	588	175	85	40.1	5.8	13.6	18.6
Ind., Ill., Ky.	1,310	679.9	100.1	248.7	185.0	32,364	5,627	14,299	4,778	1,272	648.3	90.9	240.0	187.6
Okla., Kans., Mo.	592	335.0	9.7	143.7	57.4	16,532	1,322	9,344	1,251	529	299.1	17.4	129.0	67.1
Inland Texas	276	183.3	13.3	41.0	39.4	5,788	385	1,629	1,049	241	163.7	13.5	35.2	40.2
Texas Gulf Coast	1,742	737.7	152.6	420.9	262.9	20,145	2,412	9,417	6,539	1,651	752.4	148.7	408.5	260.8
La. Gulf Coast	529	226.9	39.6	163.4	45.3	7,172	1,758	3,858	1,465	515	218.1	68.1	122.6	62.4
N. La. and Ark.	88	34.9	8.0	22.4	7.6	2,993	434	943	93	78	33.9	8.7	18.9	7.4
Rocky Mountain:														
New Mexico	18	11.0		2.9	3.9	167		60	32	17	10.4	0.6	2.5	4.0
Other Rocky Mtn.	223	110.9	5.4	44.9	43.1	5,558	337	1,623	945	232	109.1	8.4	48.6	51.0
California	953	438.1	4.3	179.1	319.7	15,859	386	10,524	17,017	946	382.4	4.6	174.3	375.6
Jan. 24, 1953	7,031	3,304.9	394.1	1,588.7	1,253.0	145,879	23,890	85,179	46,918	6,640	3,093.7	420.6	1,456.2	1,338.2
Jan. 17, 1953	7,081	3,433.9	398.7	1,557.6	1,289.0	143,492	24,932	88,773	47,745					
Jan. 26, 1952	6,584	3,092.7	409.3	1,484.4	1,317.4	143,621	23,490	71,922	39,957					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
3
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1950
F M A M J J A S O N D
1951
F M A M J J A S O N D
1952
F M A M J J A S O N D
1953

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil. Realization averaged $3.34 for week ended January 17, $3.37 for previous week, and $3.45 for January 1952. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of January 28, 1953. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10⅛-10½	12.125-12.75	10¾-11
Premium gasoline, 86-88 octane	11¼-11½	13.25-14.0	11¾-12
42-44 w.w. kerosine	8¾-9	10.5-10.65	9
No. 2 straw fuel oil	7⅜-8	9.6-9.65	8
No. 6 residual	$0.90-1.05	$2.00-2.15	$1.50-1.65

NATURAL GASOLINE

	Group 3	North Tex.	N. La.
Grade 26-70	6⅜	5⅞	6⅛
Grade 18-55	7.65	7.05	7.35

LUBRICATING OILS
South Texas

200 vis., No. 2-3 neutral	13
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS
Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	22-23
200 vis., No. 3 neutral, 0-10 pp.	12-13

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	32.5
180 vis., 0 p.t. neutral	31.5

WAX
Mid-Continent

132-134 A.M.P.	5.5

THE effect of the weather on the extremely sensitive spot markets for petroleum products is well illustrated by the situation this week in the Mid-Continent and Upper Mississippi Valley regions.

It's been "gasoline weather" in most of this area, with an open winter permitting more highway traffic than normal. As a result, the motor-fuel market is quite good for this season. But the tank-car spot market is negligible because there are ample supplies in pipe-line terminals.

Conversely, the heating-oil market is not so good, from the sellers' viewpoint. Temperatures in representative points so far this winter have averaged around 10 per cent higher than normal, so the draw-down of storage has been less than anticipated and there are no shortages except for a tightness in Chicago due to the close of navigation through the locks in the upper Illinois Waterway.

Elsewhere heating-oil stocks are moving rapidly out of Great Lakes Pipe Line terminals because demurrage charges begin February 1. Hopes for a price increase are fading rapidly, so smaller refiners may soon begin quoting tank-car prices competitive with pipe-line rates.

The market for residual fuel oil in the Mid-Continent is good, in large part because of cold snaps which have cut industrial plants off of natural gas. February 1 is the date when most refiners start moving No. 6 oil out of storage to make way for spring gasoline, so the weather during the next few weeks will be critical for the residual market.

The price of natural gasoline dropped in all areas last week due to a reduction in refinery buying. Motor fuel for warmer weather, soon to be made by refiners in large quantities, will have lower volatility, so will require less natural for blending.

CRUDE PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif‡	Okla. homa, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93			
19-19.9	1.98			
20-20.9	2.03	$2.25		$2.12
21-21.9	2.07	2.27		2.14
22-22.9	2.12	2.29		2.16
23-23.9	2.18	2.31		2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico.

Last general price change represented a 50-cent increase, effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel.	
Kettleman Hills, California*	$2.80
Louisiana:	
Beauregard Parish	2.60
Cotton Valley (distillate)	2.85
Cotton Valley (crude)	2.70
Texas:	
East Texas	2.65
Pecos County (Yates)	2.35
Conroe	2.83
Van	2.48
Pennsylvania Grade:	
Bradford	4.25
Southwest Pennsylvania	3.82
West Virginia	3.76
Illinois Basin	2.77

*37°-37.9°.

EQUIPMENT MEN . . . in the News

Totco Appoints Knight Field Representative

E. K. KNIGHT

H. H. (Pete) Peters, vice president of Technical Oil Tool Corp., has announced the recent appointment of Earl K. Knight as a new Totco field representative in the Odessa, Tex., area. Knight will be stationed at Odessa, and will work under the direction of Hugh I. Weathersby, Totco West Texas division manager.

Conroy is Named as New York District Manager

E. F. CONROY

Eugene F. Conroy has been appointed district manager of the New York office of Spang-Chalfant Division, The National Supply Co. He succeeds W. J. Stanton, who retired December 31, 1952, after 20 years' service. Conroy was formerly associated with Central Tube Co. in the New York area from 1913 until that company was purchased by National Supply in 1940. At that time he became a sales representative at the Spang-Chalfant office in New York. He was promoted to assistant district manager in 1946.

Turechek Named Consulting Engineer by Lane-Wells Co.

G. F. TURECHEK

In line with the constantly increasing demand for engineering consultation with industry on the problems of supplies, explosives, and steel, George F. Turechek, Lane-Wells Co. executive, has been appointed to the newly created post of consulting engineer, according to an announcement by Rodney S. Durkee, president.

Turechek was present at the gun perforating of the first oil well by Lane-Wells and has watched the company grow from a small shop in 1932 to a great world-wide organization today with 85 branches in the United States, Canada, and Venezuela. As chief design engineer, Turechek has supervised more than 5,000 tests on bullets and powder combinations.

Wilson Named to New Sales Post by Honeywell

O. B. Wilson has been named industrial instruments sales manager for the industrial division of Minneapolis-Honeywell Regulator Co., Philadelphia, it has been announced by L. Morton Morley, vice president.

Wilson joined Honeywell in 1923. He was industrial manager in Chicago, New York, and other offices. In 1948 he was made industrial manager for the eastern sales region. Early last year Wilson was named field sales manager for the industrial division.

Fetzer, Tubbs Promoted By Continental Supply

E. M. Fetzer, formerly manager of the production equipment division of The Continental Supply Co., Dallas, has been appointed to the position of manager of production equipment sales for its subsidiary, The Continental Supply Co., Ltd., in Canada. Headquarters for the limited company are in Calgary, with J. H. Berry as managing director.

E. M. FETZER

O. C. TUBBS

Fetzer has been with The Continental Supply Co. since graduation from Oklahoma A. & M. College in 1929, having worked in Tulsa and other Oklahoma store points.

Succeeding Fetzer as manager of the production equipment division is Odus C. Tubbs, formerly of the Houston district office.

A graduate of Louisiana Polytechnic Institute, Tubbs was with the United States Engineering department in 1936 when he joined Continental. His first position was as a construction engineer in the Shreveport office, working throughout the East Texas division. In 1946 he was made sales engineer at Corpus Christi and was transferred in 1947 to the Houston office as manager of production-equipment sales for the Gulf Coast.

Schlumberger Conducts Electrical Logging Conference

An electrical logging conference was conducted recently in Houston by Schlumberger Well Surveying Corp. The 1-week conference was attended by 28 representatives of clients and 28 company field engineers and location managers. The meeting covered fundamental theory and interpretation of electrical logging including the MicroLog.

Representatives attending came from all parts of the United States, Canada, and Colombia, S. A. Pictured, left to right, first row, are: K. S. Fricke, R. E. Jones, J. D. Fusselman, M. A. Deason, Bob Carter, D. E. Gee, J. G. Joyce, R. B. Emerson, W. J. Bowen, G. D. Volkel, R. Q. Fields, E. F. Egan, J. P. Cook, W. N. Mosley, W. P. Buckthal, C. C. Denny, J. R. Peasley, R. P. Alger.

Second row: A. M. Allegret, E. A. Colle, N. H. Ottinger, G. K. Gillies, S. G. Day, E. E. Roth, M. D. Rowe, R. N. Stine, A. F. Willibrand, Mike Davis, A. E. Van Ness, Voy Althaus, C. C. Bush, Roger Gouteyron, T. M. Rodgers, Jr., Carl Coleman, B. Q. Green, E. V. Landrigan, G. W. Blakslee, M. P. Tixier, W. B. Jackson, R. M. Smith.

Third row: R. K. Thies, D. J. Fritz, A. O. Phares, J. M. Cotton, M. Bertenet, J. B. Markolf, W. A. Schaeffer, A. J. Wessely, D. E. Corley, Earl Labertew, S. S. Galpin, D. J. Miles, G. C. Hepburn, John Richardson, H. W. Delay, P. Fustier, R. V. Drummond, Lyle Brown, W. S. Jones, and R. A. McCulloch.

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FOR SALE in Tulsa 900 new 5½" OD 8 round thread API J55 casing couplings. All or any part $4.50 each F.O.B. Tulsa. Cities Service Oil, H. D. Patridge, Bartlesville, Oklahoma.

FOR SALE: 8—Shriver 42"x42" cast iron Filter Presses, Plate & Frame type, 18, 27, and 54 chambers, 1" cake; 18—Sperry 18"x18" cast iron Filter Presses, 11 chambers; 2—±12 Sweetland Filters for 36 leaves on 4" centers. Immediate shipment. Attractively priced. Consolidated Products Co., Inc., 17-20 Park Row, New York 38, N. Y. BArclay 7-0600.

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25,000'—8⅝" OD, 22.36#, .250" wall, API 5-L, Grade B x 40' electric weld line pipe, beveled for welding. New prime quality. Located Oklahoma City. Immediate delivery.

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Shooting truck, chain pull-down drill, drill tender, 12 trace recorder. This equipment is all truck mounted ready to work and has recently been replaced by new units. It may be purchased at your own price and terms.

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NEW API CASING COUPLINGS

1000—4½" OD x 8-RD. Thrd., 6¼" long
1000—5½" OD x 10-V Thrd., 6¾" long
500—6⅝" OD x 8-RD. Thrd., 7¼" long

NEW RECESSED LINE COUPLINGS

500 Pcs. each 2", 2½", 3", 3½", 4", 5", 6" and 8"—8-V Thread.

NO. 1. USED RECESSED LINE (Good as New)

1,500 Pcs.—4"
2,000 Pcs.—6"
1,200 Pcs.—8"
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SPECIAL: 2,000 Pcs. NEW 2⅜" x 10-Round Thrd. TUBING COUPLINGS, 4¼" Long

Also other sizes Standard, Recessed Line, Casing, Tubing and Water Well Couplings.

For prices and complete information, wire or phone COLLECT
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1 OILWELL Steam Pump, 16¼ x 7¾ x 20". This pump is in excellent condition, may be seen at Makin Drilling Company Yard, Hobbs, New Mexico. Makin Drilling Company, Box 1628, Hobbs, New Mexico.

1189' of 2⅜ FAILING exploration drill pipe w/3" tool joints. Some premium grade. $2.50 per ft. F.O.B. Longmont, Colorado. P. O. Box 819.

RECONDITIONED Pumping Engines and Light Plants. XAHU Waukeshas, U-2 and U-4 Internationals, 1½ K.W. Kohlers. Completely rebuilt and guaranteed. These are bargains. Delk's Repair Service, Box 429, Great Bend, Kansas. Phone 4095.

FOR SALE: 40,000 ft. #1 3½" O.D. standard plain end line $0.55 per ft. 20,000 ft. 4" O.D. flues. Rogers Pipe and Supply Company, Phone 5-8850, Tulsa, Oklahoma.

COUPLINGS For Sale: 5,000 8⅝" O.D. Recessed Couplings, off of 28.55# pipe; priced $1.50 each; 2000 10¾" O.D. off of 41# pipe, recessed; 2500 12¾" O.D. recessed; all of the above 8V thread. All couplings cleaned and in first-class condition. A. A. Gilbert Pipe & Supply Co., P. O. Box 986, Shreveport, La.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

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AT-3427—Houston, Texas

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79,000 lin. ft. steel pipe, electric welded 24" diameter, 40 ft. lengths, 930 lb. test pressure, plain ends. Immediate delivery.

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WELL drilling equipment, new or used Spudders, rotaries, core & shot hole drills, tools, pipe, bits, blocks, pump jacks, valves. Everything for well drilling and service. Fishing tools rented. Pressey & Son, Pueblo, Colo.

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

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7" OD 26± Grade J55 Youngstown Range 3 with Hydril Speedite Threads. Streamline, 5300 feet, located Magnolia, Arkansas. Condition like new. Price OPS ceiling. Contact:

SAM SIEGEL
Ph. 4-6512, Shreveport, Louisiana.

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3—Bessemers Type X 200 H.P.
1—Clark 300 H.P.
1—Cooper Type 80, 170 H.P.
1—Bessemer Type X, 100 H.P.
30—Compressor Cylinders, Bessemers, Coopers and Clarks from 250# W.P. to 1750# W.P.
2—New and 1—Used Bessemer Type X Shafts.

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177' 0" X 38' 0" X 10' 0"

Barge only. No other equipment aboard. All steel construction with 77' 0" X 8' 6" slot. Built 1942 for crude oil towing service. Structural members in excellent condition. Some patching in order but not essential.

One Price—$30,000

Box G-293
THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

3350—H. P. DIESEL GENERATING PLANT

5—Cooper-Bessemer ENGINES 670-H.P. Each. Condition, Good. Can Be Inspected in Operation. Generator 3/60/2300-volt, Complete with Switchboards and Exciters. Complete Plant 2500-KW.

THIS IS AN EXCEPTIONAL OFFERING

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FOR SALE: R. L. Dubbledrum Cardwell fully equipped. Oklahoma City, Oklahoma. Melrose 8-5108.

USED ROTARY and cable tool drilling tools, wire lines. E. A. Kelly, 1340 S.E. 29th Street, Box 861, Oklahoma City, Phone 5-6407.

FOR SALE. TUBING COUPLINGS. 650 Pcs. 3" x 5¾" Lg. 8 Rd. Thd. Upset, 200 Pcs. 3" x 5⅞" Lg. 11½ V Thd. Pl. Tbg. All new, never used. Offered less than current prices. JULIUS M. FOGELMAN, 1649 Perkiomen Ave., Reading, Penna.

EQUIPMENT FOR SALE

6½" X 2¾" X 5½" Gardner Denver Vertical Duplex two stage water cooled compressor. Happy cooler. Skid mounted with Waukesha engine. Located Walnut, Kansas. Call Dallas, Texas, RIverside 6811.

FOR SALE: 45 Star Heavy Duty Spudder with steel pole. In A-1 Condition. With or without tools. Working now. C. H. Barker, Toronto, Kansas.

SULLIVAN 200 drill with drill pipe, tools and etc., ready to go in good condition. Inventory sent on request. R. F. Mesker, Box 6147, Tulsa, Okla. Phone 5-9357.

EQUIPMENT FOR SALE

FOR SALE: Six Type 80 Cooper Twin Compressors. Good Condition. Alfred B Kern, 223 Wright Bldg., Tulsa, Oklahoma.

MOUNTED Rotary Drilling Rig. Dodge Truck, 1500 feet, Two Men Operate, Fast, Durable, Efficient, Roller Bearing. Money Maker. $3000. Box 106, Seminole, Oklahoma.

FOR SALE: 110 Riise Drilling Motor. Reasonably priced. Ralph V. Brick, Gnadenhutten, Ohio. Phone 4-4632.

ONE Cardwell "S" draw works with air clutches and WAKU Waukesha engine, 87' jackknife mast with 6' 6" substructure, 2 power slush pumps with engines. Wilson swabbing unit. QRC blowout preventers, 4" x 6" water pump. Rig complete with tools for workover and servicing. Stacked near Houston. $55,000.00. Norvell - Wilder Supply Company. Box 2178 Houston, Texas. Phone AT-3471.

2 FAILING Model 1500 drills, shop number 908 mounted on KBS-7 1947 International truck, shop number 909, of special design mounted on GMC 6 x 6. Both drills in good condition and reasonably priced. Write for prices and list of equipment. Box G-193 The Oil and Gas Journal, Tulsa, Oklahoma.

BOILERS:

HAVE A FINE STOCK AVAILABLE
of WATER TUBE, Code Boilers 150/400# psig: All Standard Sizes. Also Turbo-Generators, Boiler Feed Pumps, all Sizes & Pressures. Advise Your Steam Pressure and Size. IMMEDIATE DELIVERIES.

CHARLES WEAVER, OWNER
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COMPRESSOR STATION EQUIPMENT

The following units and equipment originally installed in 1949 have become surplus due to compressor station changes this year:

275 H. P. Ingersoll-Rand PVG Gas Engine direct coupled to G.E., 190 KW Alternator, 480 V., 3 phase, 60 cycle, with 128 V. exciter.

Westinghouse switchboard control unit for above 190 KW, A.C., engine generator set complete for generator and power service connection. Contains 600 Amp. incoming line and generator breakers, 6-225 Amp. feeders, with all meters and synchronizing equipment.

2 - Ingersoll-Rand 3RVH-5 pumps	1 - 300 GPM, 52' TDH	
	1 - 225 GPM, 55' TDH	
1 - Ingersoll-Rand 3RVL-3 pump	225 GPM, 28' TDH	
1 - Ingersoll-Rand 3RVL-5 pump	275 GPM, 31' TDH	
2 - Smithway Vertical turbine pumps	300 GPM, 53' TDH	
1 - Smithway Vertical turbine pump	400 GPM, 63' TDH	
1 - Water Tank Cylindrical, 25' Diameter x 50' high, 183,000 gallons		

The following items are various ages and quality offered subject to your inspection or inquiry concerning their condition. All of them were in service until this year.

11 - Shell and tube coolers, Style FST, 250 PSI W.P., Shell 705 sq. ft. surface, 75 PSI W.P. tubes.

2 - Shell and tube coolers, Style FST, 500 PSI W.P., Shell 705 sq. ft. surface, 75 PSI W.P. tubes.

Various tanks, gate valves, in sizes from 20" to 4", buildings from 20' to 126' long.

Following compressor cylinders for horizontal engines:

4 Transit Cylinders - 200 to 250 PSI W.P. 23" x 36"
4 Transit Cylinder Liners 27" x 36"
2 Transit Cylinders - 425-500 PSI W.P. 14½" x 36"
14 Cooper Cylinders - 500 PSI W.P. 13½" x 36"

Following compressor cylinders for angle type engines:

15 Worthington Cylinders for LTC, 5 cyl., 200-250 PSI W.P. 12¾" x 15" with 15 distance pieces.
13 Clark cylinders for VTH, 300 PSI W.P. 12½" x 14"
9 Ingersoll-Rand Cylinders, 1000 PSI W.P. 8¾" x 14"

Send for complete list and description
Purchasing Department

MISSISSIPPI RIVER FUEL CORP.

407 N. Eighth St. St. Louis 1, Mo. Phone GArfield 2030

NEW
4" O.D. ASPHALT COATED
IRRIGATION TUBING

10,000 ft. available
40-ft. lengths

Immediate Delivery
from Stock.

Write—Wire—Phone

SONKEN-GALAMBA CORP.
2nd and Riverview (X-926)
Kansas City 18, Kansas
THatcher 9243

Gas Desulphurization Plant For Sale

Complete facilities. Can be used on location or dismantled and moved. Can be converted into gasoline plant. In Excellent Condition, used only a short time. Priced considerably below present replacement cost. Consists of following:

DESIGN SPECIFICATIONS

30 million cubic feet per day
Gas pressure—40 PSIG
Gas temperature—105°
Gas specific gravity—0.78
H_2S Content inlet—365 GR/100CF
H_2S Content outlet—0 GR/100CF
Solution—MEA 30%

Buildings and equipment in place:

1—Office and Warehouse, frame building, 24'-0" x 36'-0".
1—Pump and Instrument Building, steel frame, 40'-3" x 24'-9".
1—Boiler House, steel construction, 61'-0" x 42'-6", 31'-0" ceiling.
1—Reactivator.
1—Reflux Accumulator.
2—Reflex Pumps.
1—Absorber.
1—4-unit Fin Fan Cooling Heat Exchanger.
1—Knock-out Drum.
1—Solution Heat Exchanger.
1—Reboiler.
1—Water Softener Unit and Pump.
2—24,000 lbs.-per-hour B & W gas fired Boilers, with steam turbines and speed reducers.
1—Sewage Disposal System.

This plant is complete and in good operating condition. For further data or appointment to inspect plant, contact:

Witco Chemical Company
1400 West Tenth Amarillo, Texas
Tel. 3-2855

EQUIPMENT FOR SALE

1—BJ 200 ton 10¾" slip casing elevator with slips. 3—National 150 ton Ideal Swivels. 2—6" GS Swivels. 1 over and under National Crown Block. 4000' 6⅝" OD Drill Pipe with 7⅝" API regular tool joints. 1 set 2¾" x 96" BJ Weldless Links. E. A. Kelly, 1540 S. E. 29th Street, Box 861, Oklahoma City. Phone Jackson 5-6407.

SEISMOGRAPH water truck. FAILING built 700 gallon cap. Ford F-6. Located at FAILING'S Houston shop. Contact Eldon Eeds at LD 1, Beeville, Texas.

FOR SALE: In Oklahoma, Kansas, Texas, and New Mexico, a quantity of Angle Iron derricks. Complete detail and prices upon request. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

DIESEL Electric Generator Unit like new. Total 746 hours operating time—37½ KVA, 3 Phase, 60 Cycle, 220/440 Volts, 1800 RPM Century Generator, direct connected to 72 H.P. Model 6DTG317 B/M #D3076, Buda Diesel. Located on our Ducommon Lease Section 26, T6N., Crawford County, Illinois. Price $3,000.00. Red Head Oil Producing Company, Brilliant, Ohio.

FOR SALE: In Oklahoma, 2 used 4½x10" Type K Worthington Duplex Power Pumps driven by RXB Hercules Power Units, mounted on steel base, been in Oil Pipe Line service. Price $2500.00 unit. Cities Service Pipe Line Company, Patridge, Bartlesville, Oklahoma.

GAS METERS FOR SALE. Westcott, Foxboro and Emco. Good condition. Geo. R Milner, Box 124, Okmulgee, Oklahoma.

FOR SALE: One Barrel Type Ethyl Lead Plant, Hutex Oil & Refining Company, P. O. Box 2146, Houston, Texas.

FOR SALE in Oklahoma and Kansas a number of large horizontal gasoline storage tanks. List and prices available upon request. Cities Service Oil Co., Patridge, Bartlesville, Okla.

FOR SALE: National Drilling Rig. Capacity 4,000 Feet. Good Condition. Buffalo Motor. Tools and Line not Included. Wolf's Head Oil Refining Co., Inc., P.O. Box 137, Oil City, Pennsylvania.

FOR SALE: One double drum Super-Mogul Wilson Spudder, powered by PA-100 International motor. $2500.00. Fox Well Servicing Company, Healdton, Oklahoma.

FOR SALE

D C 110-115 Volt Electric Motors, ⅛ to 10 H. P.—D C Generators with diesel drivers—D C Motor Starters and Magnetic Controls—D C Electric Bench Grinders—One Westinghouse Switchboard Panel. All in good working condition. Itemized list available. If interested contact: A. V. WINTHER, PASOTEX PIPE LINE COMPANY, P. O. BOX 1022, EL PASO, TEXAS.

FOR SALE: 1—D-4 Caterpillar Wide Gauge with Hydraulic Angle Blade in good condition. 7U Series. Atlee Schlabach, Charm, Ohio.

EQUIPMENT WANTED

WANTED to Buy—Good, serviceable fluid end for 7¼ x 14 PHD oil well pump. Call or write Harvey Drilling Company, 704 City National Building, Wichita Falls, Texas.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Greer Pipe & Supply Co., Box 1383, Tulsa, Oklahoma

WANTED: Three engine compound for Wilson Titan drawworks. Makin Drilling Company, Box 1628, Phone 3-3141, Hobbs New Mexico

WANT LIGHT portable rotary drill complete, 2500 to 3000 ft. depth. Prefer truck mounted. T. R. Davis, 700 Mosley Street, Vidalia, Georgia.

HELP WANTED

GEOLOGIST wanted to headquarter in Denver with independent oil company. Must have well sitting, sample examination and mapping experience, and at least two years experience in Rocky Mountain Area. Reply will be kept confidential. Box G-264, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

CHEMICAL ENGINEER for design and/or field installation of gas process equip. At least 2 years exp. in plant process or construction. Leading S. W. Manufacturer. Box G-270, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Engineers, graduates, minimum three years field experience, one year contract, foreign work. Prefer single men experienced in drilling operations and mud control. In replying give education, experience, and salary expected. Address Box G-296, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Experienced completion and production man to handle new field in Colorado having 12 producing wells at 5000 foot depths. Housing furnished. Reliable and financially strong concern. Give age, experience and salary desired. All replies confidential. Box G-285, The Oil and Gas Journal, Tulsa, Oklahoma.

MAKE YOUR CAREER A RESEARCHER AND TEACHER IN PETROLEUM SCIENCES

On September 1, 1953, two persons will be added to the regular staff of the School of Petroleum Engineering, University of Oklahoma. One position is for a junior member of the faculty who has received a Ph.D. or Sc.D. in Petroleum, Chemical, Mechanical Engineering or a Ph.D. in Chemistry or Physics. The person selected for this position will teach undergraduate and graduate courses and direct some research.

The second position is for a senior member who has a Ph.D. or Sc.D. degree and two or more years of experience in petroleum production or related work. The person selected for this position will direct the research program of the School of Petroleum Engineering as well as teach a few advanced courses.

The basis of selection of a person for each position will be on over-all qualifications. Faculty members are permitted to do some consulting work and they are urged to participate in remunerative research through the University of Oklahoma Research Institute.

For additional information and application forms write to:

Prof. H. W. Benischek, Chairman
School of Petroleum Engineering
The University of Oklahoma
Norman, Oklahoma

HELP WANTED

CONSTRUCTION SUPERINTENDENT Construction and engineering firm has opening for experienced construction superintendent. Must have had at least ten years recent experience in the construction of Oil and Gas Process Facilities. Must be qualified to assume complete responsibility of entire projects under his supervision. Salary commensurate with experience and ability. Applicants must give complete resume of experience, education and former employers; also age and marital status, to Box G-286, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN with minimum of 5 years land experience to serve as district man in Gulf Coast area for operating company. Replies confidential. Box G-301, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST with Canadian or Rocky Mountain experience wanted by independent oil company to headquarter in Calgary. Replies will be kept confidential. Box G-265, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST

Independent oil company has opening around February 15th for experienced, capable sub-surface geologist. Must be thoroughly familiar with Oklahoma and should have working knowledge of Mid-Continent Area. Good position for right person. In applying, give past employment record, educational background, and age. All replies strictly confidential. Box G-300, The Oil and Gas Journal, Tulsa, Oklahoma.

..DISTRICT..

ELECTRICAL ENGINEER

Major Oil Company has opening for graduate electrical engineer with 7-10 years experience, to take charge of planning, coordinating, and expediting of all electrical engineering and construction work in an operating district in Venezuela.

Write giving full details of experience, etc., to

P. O. BOX NO. 35
BOWLING GREEN STATION
NEW YORK 4, N. Y.

WANTED

EXPERT IN THE OIL & GAS INDUSTRY

by industrial organization in New York. Must have contacts and be familiar with oil & gas production in the large oil & gas producing states. Send complete resume including references and salary required to

BOX G-288
THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

WANTED

GAS OR PETROLEUM ENGINEER

Complete knowledge of checking reserves, pressures, formations and familiar with the large oil and gas producing states. Reply in confidence to

BOX G287
THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

HELP WANTED

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

SEISMIC PERSONNEL needed for United States and Canada by well known and expanding contract geophysical company. Address Box E-863, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEER with storage tank, field, and drafting experience; wanted by well established company in Southwest. Good salary and future. Replies will be kept confidential. Box G-282, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL Industry Employment Service, 405 Tuloma Bldg., Tulsa, Okla. 4-5974. Tom Robinson, owner. For Technical and Trained Personnel, including LPG.

ASSISTANT Chief Engineer, age 30-45. Graduate and registered engineer. Experienced in gas pipe line design and construction. Mail reply giving qualifications. Box G-292, The Oil and Gas Journal, Tulsa, Oklahoma.

NEED Reservoir Engineer that can also assist in looking after two drilling rigs just across the border in Mexico. Salary depends on experience. Car and expenses furnished. No U. S. income tax. Call collect 6-5224 McAllen. Wire or write G. Prince, 221 South 10th Street, McAllen, Texas.

PROCESS ENGINEER—Chemical Engineer with exceptional individual initiative and 4-6 years experience in petroleum refining to assume new position with independent company located in North Texas. Send complete resume. Box G-290, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED

Salesmen to contact oil field production superintendents, petroleum engineers, purchasing agents and supply houses. The parties we are interested in must be on the road day after day introducing our D W Multiple Seating Oil Well Pump Valves to the trade. D W valves will run 300% longer in the hardest producing wells, and will not spin out cages. D W valves save the producer from two to three costly pulling operations where valve failure is common practice. All states west of the Mississippi River are open territory as well as two states east of the Mississippi River, Alabama and Mississippi. In your first letter let us know the state or states you are now covering. This proposition is strictly on a commission basis. We prefer parties who are now dealing with the trade. DEEP WELLS, INC., Box 5064, Tulsa, Oklahoma.

SITUATIONS WANTED

YOUNG, aggressive, experienced Geophysicist with both contract geophysical and (present position) major oil company geophysical (supervisory) backgrounds wants a better, more challenging job in seismic exploration. U.S. or Canada. Box G-283, The Oil and Gas Journal, Tulsa, Oklahoma.

DETAIL clerk, stenographer, bookkeeper desires position with independent in Oklahoma City. Accepts responsibility, courteous, efficient, conscientious. Experienced in land, legal and drilling. Box G-278, The Oil and Gas Journal, Tulsa, Oklahoma.

PILOT POSITION WANTED

Fully qualified and experienced executive pilot desires position with stable oil company. Highest character and ability references, age 37, married. Over 5000 hours experience domestic and overseas, including transocean. Box G-273, The Oil and Gas Journal, Tulsa, Oklahoma.

CONSTRUCTION SUPERINTENDENT ENGINEER

Over 20 years experience with top ranking Contracting Engineers and Constructors, and Major Oil Company on refinery and pipe line projects, both domestic and foreign. Desire to make a change. Graduate Texas A. & M.

Box G-277
THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

SITUATIONS WANTED

GEOLOGIST: 1½ years experience with major oil company in Rocky Mountain area and Williston Basin. Experienced in Rocky Mountain surface, subsurface and well sitting in Wyoming and Williston Basin. Bachelor of Science degree in Geological Engineering. Box G-281, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico Personal interview by appointment is desired. Makin Drilling Company, Box No 1628. Ph. No 3-3141, Hobbs, New Mexico

PETROLEUM ENGINEER, age 32, 7 years varied experience, Drilling and Production Gulf Coast area. Desire position with expanding organization. Box G-267, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Production Engineer. Age 32. Seven years major company experience in production and drilling operations. Desires responsible position with active independent. Box G-268, The Oil and Gas Journal, Tulsa, Oklahoma.

CPA wishes to make connection with progressive firm. Fully qualified, dependable. Would move to any location. Box 1324, Denver, Colo.

PETROLEUM Geologist, Age 47, married, now in consulting capacity, wishes to re-enter Oil Company, staff, research or coordination; subsurface geology, paleogeography, geophysics. Prefer foreign; would consider domestic. Box G-262, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE Petroleum Engineer, age 47, 18½ years experience as Engineer and Production Superintendent for one Company in Illinois, Kansas, Oklahoma, and Texas. Desires a permanent connection. Box G-289, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: 4½ years experience in Rocky Mountain area with major company —subsurface, surface, well-sitting. Age 31, single. Desire position with good future. Preferably Rocky Mountains. Box G-291, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL Engineering Professor, MIT doctor, eleven years design research development experience. Desires consulting or full time responsible position. Box G-294, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST, 6½ years major company. Graduate engineer. Age 33, last four years seismic interpretation. Box G-295, The Oil and Gas Journal, Tulsa, Oklahoma.

WITH five years experience as Oil Scout and Leaseman in the Rocky Mountain area, desire to obtain retainer on a commission or salary basis to represent investors in Federal and State lands through Rocky Mountain area. Have access to immediate information on new discoveries and can acquire land for you in land plays that invariably develop, and that are geologically favorable. References furnished. Box G-296, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED PETROLEUM GEOLOGIST (Gulf Coast, West Texas, Mid-Continent, Rocky Mountains). 9 years major, 4 years independent. Specialist regional and local subsurface problems. Location open. Box G-299, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY Engineer, M.S. degree, ten years diversified experience. Desire responsible position in refinery operations, sales or with contracting firm. Box G-302, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASE AND DRILLING BLOCKS

LEASES ROYALTIES

Producing and Nonproducing

Bought and Sold—Any Area

Inquiries Invited

B. D. BUCKLEY

6635 Delmar Ave., St. Louis 5, Mo.

LEASE AND DRILLING BLOCKS

WANTED—Farms, Oil Leases, Royalties, Cass County, Texas, White County, Illinois. Address: W. Rothenhoefer, 1444 Kingsland, St. Louis 14, Mo.

LEASE 940 acres joining lease being drilled by Kansas Oil Inc., Vermillion Basin. 3.00 acre. H. T. Harper, Vermillion, Kansas.

DRILLING Deals. See A. L. Bowles, Rollow Bldg., Ada, Okla.

WILL Buy Leases or Royalties on order in Texas, Oklahoma, for individuals, corporations. M. H. Halff, 210 Empire Bank Building, Dallas.

10,000 ACRES under lease in Pennsylvania near production and wildcat activity. Money needed for wildcat and development. Box 2, Clarendon, Pa.

DALLAM COUNTY, TEXAS: 8000 acres solid block one owner. ½ County leased to Major Companies. $1.25 bonus, $1.00 rentals, 10 year commercial lease. Combest Royalty Company, Amarillo, Texas.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

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SW ROOSEVELT & SE DEBACCA, N. M. Roosevelt—Wells drilled into San (Permian) Andreas show indicated production 2 zones. Offset to be drilled to shut in well sec. 31-2-31. DeBacca—Texas interests plan well north of Pennsylvania well which showed 3 million c.f.g. and distillate at 6350 ft. sec. 18-4-27. Engineering data on request. Some Over Ride Royalty and Leases close in.

W. J. PETERMAN, Geologist
Portales New Mexico

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